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08 Great Value Hardware

A lot of computer components are expensive, especially if you want to get something that offers a decent level of performance, but that doesn't have to be the case. As Mark Pickavance shows us this week, there are plenty of deals to be found, if you know where to look. So why not give your PC a boost with one the great bargains he's found?

18 Trading In Old Tech

One of the side-effects of our constant lust for upgrades, is the hundreds of pounds worth of unused gadgets that can end up clogging up our drawers and shelves. You could, of course, donate items a friend or family member, but there's also the possibility that you could turn it into cash, which can help to pay for more new stuff. To give you an idea of the best ways to make money from your old tech, David Crookes has some helpful tips

46 Group Test: 2GB Graphics Cards

A good amount of video memory can help with things like video editing and textures in games, but the prices of these cards varies hugely, because there are so many other factors to think about. With that in mind, we've been checking out six cards with 2GB of RAM and seeing just what they can do

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56 Google Chrome Remote Desktop

Google's free remote access solution has been available for a while, but only recently has the app been available for iOS devices. Taking that as his cue, John Moore looks at how you go about setting it up and considers how useful it can be for work

60 App Inventor 2

Creating any kind of software usually requires some knowledge of coding, but visual languages can simplify matters immensely. With the latest version of Google's App Inventor, you can make your very own Android apps much more easily than if you had to learn Java or whatever. David Briddock looks at what it has to offer and considers whether you can really make money from it too

64 Hardware You Might Never See

Vapourware, as you may already know, is a word used to describe a product that is announced to the public, but never quite manages to make it to sale. We know many products that have eventually fallen into this category, but what of those that are meant to be released in the future? Well, Mark Pickavance has identified a few projects that he can't see making it, and he's shared his thought with us on the matter

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GREAT VALUE HARDWARE

Mark Pickavance paints bull's-eyes on those hardware items that represent the best value around

Here at Micro Mart we like to think that others can extoll the virtues of spending big on computers and phones, because bargains have their own special virtue. There is something intrinsically cheering about having almost all the capabilities of a top-end solution, having paid only a portion of that premium price.

If you're in the market for some new hardware and want your money to go further, then read on. Here are just a few of the exceptional deals that you can find on computer hardware now.

Video Cards

Unless you have a motherboard that can accept multiple video cards, then the video capabilities of your system are probably going to rely on a single discrete card or whatever integrated options you have.

Therefore, if you like to game, you really want to invest in the best possible single GPU that you can. However, that choice also needs to take into account what the power requirements are and how much space you have in your case.

The other decision is your preference for either AMD or Nvidia as the GPU maker, if those details are important to you.

If Nvidia is your GPU maker, then it hasn't yet launched the

affordable 900 series, and the 800 series was leapfrogged, so you're looking at the middle 700 series card as the price/performance sweet spot.

The very best deals in this range are around the GTX 740 and GTX 750 Ti series cards. Avoid anything lower, because they don't have the bandwidth needed to play games at high resolution and detail. And avoid the GTX 745, because it uses DDR3 memory and therefore little bandwidth.

For AMD fans, the R7 200 series middle-order cards are the ones that offer the best value, specifically the R7 250 and R7 260 cards. These are great performers and can both be found well under £100.

Here are two from each GPU maker, for those who need pointing in the right direction.

EVGA GT 740 SuperClocked 2GB

Price: £79 (Ebuyer)

Part No: 02G-P4-3747-KR

There are some DDR3 versions of the GT 740 going around that you don't want, but this EVGA card uses GDDR5, and you might like it.

The big selling points of it are that it has 384 CUDA cores, and in this 'SuperClocked' version, EVGA has pre-tweaked the GPU to 1085MHz from the stock 993MHz.

“ There is something intrinsically cheering about having almost all the capabilities of a top-end solution, having paid only a portion of that premium price ”



That's an additional boost, and the card also supports the new Nvidia adaptive sync technology if you have a monitor with this feature.

You'll need a 400W PSU and a PCIe six-pin power line, although EVGA does provide a converter from Molex if you don't have that feature on your power supply.

Here are the critical details:

1085MHz core, 2048MB 5000MHz GDDR5, 384 CUDA cores, DirectX 11.0 support, Nvidia PhysX technology, Nvidia SMX Engine, Nvidia Adaptive Vertical Sync, Nvidia Surround, HDMI, DVI, DisplayPort

MSI GeForce GTX 750 OC

Price: £85.99 (Overclockers UK)

Part No: N750-1GD5/OCV1

Where the GT 740 uses a Kepler GPU, this GTX 750 is the latest Maxwell GPU technology that is also used in the new GTX 900 cards.

In performance terms, this is a quicker card with more CUDA cores, but critically it's also more power efficient. The card uses just 60 watts at stock speed and doesn't require a PCIe power line.

The only downside to this design is that it doesn't have a DisplayPort adapter, so it can't support G-Sync monitors. The devil, as they say is in the detail:

1059MHz core boosting to 1137MHz, 1024MB 5000MHz GDDR5, 512 CUDA cores, DirectX 11.2 support, OpenGL 4.4 support, Nvidia PhysX technology, Nvidia SMX Engine, Nvidia Adaptive Vertical Sync, Nvidia Surround, HDMI, dual-link DVI-I and VGA.

Sapphire Radeon R7 265 Dual-X 2048MB

Price: £99.95 (Overclockers UK)

Part No: 11232-00-20G

This card uses the excellent Curaçao PRO 28nm GPU, and with 2GB of GDDR5, it has an impressively high bandwidth of 179.2GB/s.

That you can get this card, which supports multiple simultaneous displays through Eyefinity and has the power to drive them, at this low price is quite stunning. It requires a single PCIe six-pin power line, and can be used in CrossFireX multi-card mode if you fancy buying two or even three of them.

Tons of power and lots of shaders makes for very high-resolution games with all the detail settings maxed out.

Here are the specs:

900MHz core, 2048MB 5600MHz GDDR5, 1024 stream processors, DirectX 11.2 support, ATI CrossFireX Ready, ATI Eyefinity, ATI Stream, ATI Avivo HD, ATI HD3D Technology, HDMI, two DVI and DisplayPort.

Asus Radeon R7 250X 1GB

Price: £75.90 (Dabs)

Part No: R7250X-1GD5

If you want something affordable to play 1080p games on, then this is an exceptionally good choice, given the available options. Based on the Cape Verde XT GPU that originally appeared in the HD 7770 GHz Edition, this is a powerful card that features triple display outputs (DVI, HDMI and DP) and puts out 1,280Gflops.

I recall the first Eyefinity cards from AMD cost hundreds, and this one supports triple output by default. However, driving three 1080p displays with lots of detail is probably beyond the bandwidth available here. Those looking for a bit more power might find the 2GB version of this same card for an extra £20.

This is what you get for your money:

1000MHz core, 1024MB 4500MHz GDDR5, 640 stream processors, DirectX 11.2 support, ATI CrossFireX, ATI Eyefinity, ATI Stream, ATI Avivo HD, ATI HD3D Technology, HDMI, DVI and DisplayPort

SDD Drives

Solid-state drives have quietly moved from something only the most affluent PC owners used to a mainstream component at the heart of many computers.

With new models arriving all the time, there are some excellent previous-generation products just waiting to be snapped up. While technical terms like IOPS are made much of by the manufacturers, random read and write performance in MB/s is always a good indicator of overall performance.

Here are a few fast SSD bargains I've noticed. Get them while you can.



Crucial MX100 256GB

Price: £79.99 (Dabs, Overclockers UK)

Part No: CT256MX100SSD1

I only reviewed this product a few months ago, and with the new Crucial BX100 and MX200 about to launch, it is already being discounted in preparation.

This design uses 16nm MLC NAND and is rated with an endurance of 40GB a day for five years or 72TB total bytes written. They also feature some of Crucial's latest SSD twists, like a Power Loss Protection technology that avoids leaving the drive corrupted in the event of sudden power loss.

The 256GB model reads at 550MB/s and writes at 330MB/s, and those that go for the 512GB version will find that the write speed is bumped to 500MB/s.

And every MX100 comes with a free copy of Acronis True Image 2014 OEM Edition PC Backup and Recovery, for all your drive transfer needs.

The MX100 is an excellent product that will give any system converting from conventional hard drive technology a major kick in the pants.

SanDisk X300 256GB Enterprise Class SSD

Price: £77.10 (Scan)

Part No: SD7SB6S-256G-1122

Most users can't usually afford any hardware with 'enterprise' in the title, so you might want to take some note when low-cost SSDs meant for corporate use appear at a very low price.

The X300 drives were built for corporate laptops and feature an aggressive power conservation low-power mode, AES 256-bit drive encryption and an on-the-fly error handling mechanism called Multi-Page Recovery (MPR).

What makes them even more desirable for home system users are the speed ratings of 530MB/s reads and 470MB/s writes, along with 90,000 random read 4K IOPS and 74,000 random 4K write IOPS.

The X300 is a class act, and at this price, it's well worth a punt.

Samsung 250GB 840 EVO Series

Price: £95.30 (Ebuyer)

Part No: MZ-7TE250BW

Samsung is currently revamping its

SSD range with the new 850 series models, so anything labelled 840 is on the chopping block.

I reviewed the 840 EVO for Micro Mart and can confirm they're exceptional performers and come either as a bare drive or as an upgrade kit for laptop and desktop systems. The extra gubbings in the upgrade kits adds about £15, so expect to pay about £110 for one of those.

The 840 EVO is built around Samsung's own three-core MEX controller and its Toggle DDR 2.0 NAD flash modules. It's very reliable and super quick.

Expect read speeds up to 540MB/s and writing at 520MB/s, plus very good IOPS for both reading and writing.

If you want an SSD that delivers the full effect, then you need look no further, because this drive goes about as fast as SATA-3 can handle. A recent 30% reduction in cost makes these desirable devices even more accessible.

Monitors

The first LCD panels that I reviewed cost in excess of £1,000, but these days they're much less for even a high-quality screen. The cheaper ones tend to have fewer ports, although that's not always the case.

Before you buy, make sure that the panel is suitable for your purpose, as some are designed specifically for gaming (high refresh) or accurate colour representation.

Here are three really desirable screens at bargain basement prices.

Asus VN247H

Price: £144.99 (Ebuyer)

Part No: 90LMGF001T01041K

Asus makes lots of nice hardware, but some of its displays are really spectacular. The VN247H is a 24" widescreen aspect TN panel with an exceptionally narrow bezel, designed for those who want to have multi-panel setups without any significant gaps.

Inputs include two HDMI and a VGA D-Sub, covering both PC and game consoles, along with TV streaming devices.

The 1ms refresh timing of this screen makes it good for gaming,





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Overall Score, January 2011 - January 2014, AV-TEST

Bitdefender	5.3
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Symantec	4.0
McAfee	2.9

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(on a scale of 0 to 6 and 6 being the **lowest impact**)
www.av-test.org

Overall Score, January 2013 - January 2014, AV-TEST

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“ Acer makes some superb monitors, but you usually pay through the nose ”

since it doesn't suffer with ghosting artefacts or substantial decoding lag.

One catch I've noticed is that the settings are generally adjusted incorrectly from the factory by default, and you'll need to adjust them to get the full scope of the contrast and colour presentation. With the right tweaks, the VN247H can be an amazing screen and better than many costing £50 more.

Unfortunately, it's so good that you might have some difficulty finding a supplier with available stock.

Acer G246HLBbid

Price: £109.98 (Ebuyer)

Part No: UM.FG6EE.B01

Acer makes some superb monitors, but you usually pay through the nose for the better ones. This G246HLBbid is a 24" twisted nematic film (TN film) panel, like the Asus VN247H, I've also mentioned here.

This design has a slower 2ms response, but it does include as standard DVI, HDMI and VGA inputs. It's wall mountable and only uses 19.8 watts when operational, which is good for a 24" panel.

What picked this design out for inclusion was both the price and the generally very positive things said by people who have bought one. Most are delighted with the G246HLBbid, even if they paid more than you can currently acquire one for.

BenQ GW2760HM

Price: £155.99 (Overclockers UK)

Part No: 9H.L9LLA.TBE

For office work, 24" displays are probably ideal, but for some jobs even bigger ones can be nice if you can afford them.

The BenQ GW2760HM is a 27" panel but is priced like you'd expect a 24" would be, and it uses VA panel (IPS) technology. VA

technology doesn't offer the high refresh rates of TN (this one has a 4ms rate), but the colour representation is exceptional, as are the distinctly deep blacks. It also has 178° viewing angles in both directions and a 5000:1 native contrast ratio.

For anyone working with photos or design, the BenQ GW2760HM is an inexpensive means to see what you're doing in exceptional clarity.

Sealing the deal, the GW2760HM has all three standard inputs (DVI, D-Sub and HDMI), plus BenQ provides a two-year on-site warranty with each display.

Smartphones

Unless your admiration of Apple blinds you to the cost or you just adore the top-spec mobile devices from HTC and Samsung, then it's hard to ignore how expensive they can be. However, there are some phones that deliver admirable performance and features for a fraction of the cost of high-end products.

Check out these if you'd like a great phone without a massive up-front bill or expensive contract.

Motorola Moto G 4G LTE

Price: £99 (Tesco)

Part No: XT1039

I'm on my second Moto G after my daughter broke her phone and I offered up my original first-gen design as a replacement. The new model improves on the original Moto G by adding 4G LTE support, and having a micro-SD card slot and 8GB of storage as standard.

A big plus point is that it comes with an almost vanilla version of Android KitKat 4.4.4. and the Lollipop update to this design has already been released in the USA and India, so very soon this phone will be at the same OS level as the official Google Nexus devices.

The price I've listed here is the Tesco mobile locked model, which



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is £40 cheaper than the SIM-free variety. Unlocking the phone for another network is very easy, voids your warranty but costs substantially less than £40 to do.

The Moto G might not have the best camera around, but it doesn't remotely feel or work like you might expect a budget phone to.

This is a great first smartphone for a youngster or someone moving from a feature phone.

Nokia Lumia 735

Price: £159.99 PAYG (O2)

While the Nokia name is just a brand that Microsoft is now undermining, before the company was sold, its mobile phone division designed some very impressive devices. One of these is the 4G-capable Lumia 735.

This is a phone that manages to be cheap while feeling like something substantially more expensive. It features a 4.7" 720P OLED display, 1.2GHz quad-core Snapdragon 400 CPU and 8GB of internal storage as standard. Storage can be further expanded by a micro-SD card up to 128GB.

Those who like pictures will find the Lumia 735 has two cameras: a 5MP front-facing selfie and a better 6.7MP rear with an autofocus lens and flash.

The latest Windows Phone 8.1 firmware allows you to chat with Cortana and organise your picture collection on OneDrive.

The quoted PAYG cost probably isn't the best deal. An even better value Lumia 735 is that from EE which, at the time of writing, is offering it free with 500 minutes, unlimited texts and 500MB of data on a 4G service for just £14.99 a month for 24 months.

If you want a nice phone and don't care what OS it has, the Lumia 735 is a great choice, and it might even get upgraded to Windows Phone 10 in the future.

Sony Xperia M2

Price: £125 PAYG with Vodafone
Sony makes really good phones, even if it's not a brand that jumps to mind immediately when you think about smartphones. Its Xperia range has some great specs and expensive devices, but it also makes some very affordable models.

The Xperia M2 is a cheap and very cheerful Android phone, with a 4.8" display, 8GB of storage, 8MP camera and 4G LTE connections.

Where cheaper designs usually eliminate features to differentiate them from more expensive models, for some reason, Sony didn't do it with the Xperia M2. Unexpectedly it has 802.11ac wi-fi, 1080p video recording, NFC, a micro-SD card slot, quad-core processor and even an FM radio.

Those who purchased it also liked the very practical battery life, which is half decent for a smartphone these days.

Laptops

Cheap laptops are probably partly responsible for Microsoft's woes, because if you only pay £200 for the computer, why would you pay as much for the software on it? Yet they're still popular as education devices and for those who like to surf in front of their TV. Here are a few good ones that are worth considering for those that like to see their cash go further.

HP Stream 11

Price: £179.99 (PCworld)

Part No: 11-d007na

I've been trying to get one of these to review for Micro Mart for some time, but it appears that HP sells all it makes instead of letting my sticky fingers get a grip on one.

The Stream 11 epitomises the netbook ethos, using a dual-core 2.16GHz Intel Celeron processor N2840, 2GB of RAM, and with just 32GB of eMMC storage.

That's coupled to a 11.6" 1366 x 786 resolution display, a battery that gives nearly six hours usage and a half-decent keyboard.

It also has Bluetooth, a webcam, an SD card slot and DTS sound, but these aren't the really big selling points. Incredibly, for less than £180, this system comes with Windows 8.1 preinstalled, along with a year-long subscription to Office 365 Personal and a £20 voucher for the Windows Store.

Seeing as Office 365 usually costs you £59.95 a year to access, this must be one of the best deals ever.



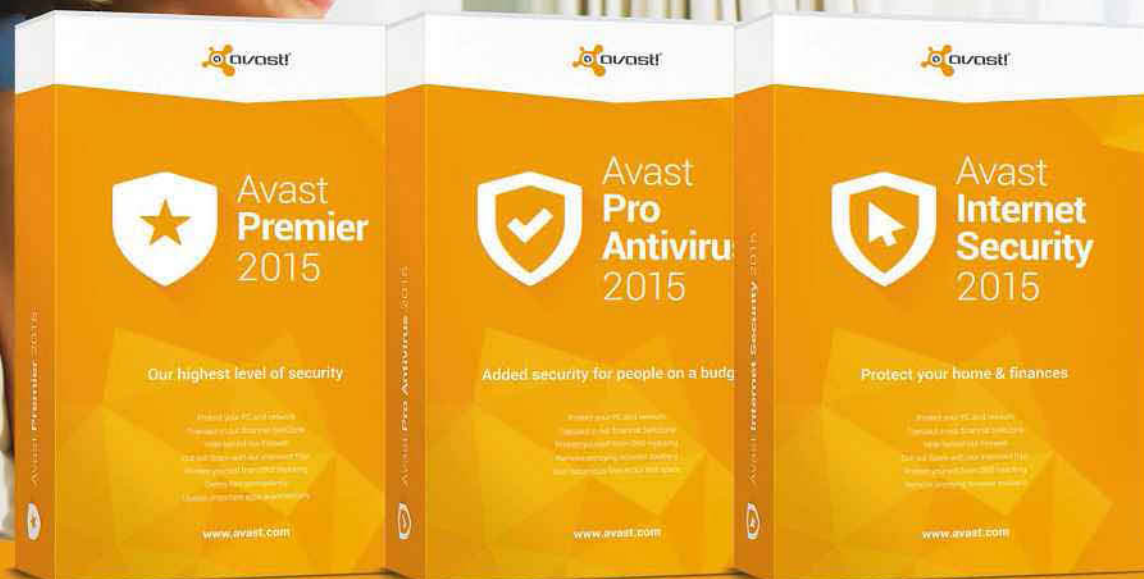
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Asus X200MA Touch Laptop

Price: £199

Part No: X200MA-CT099H

If you're feeling slightly flush with cash and have an extra £20 more than the HP Stream 11 costs, then you might want to consider the Asus X200MA.

On paper, the two systems are very similar, as they use identical processors, screen size and architecture. Plus they both come with Windows 8.1 preinstalled.

However, the Asus doesn't include Office 365, but it does come with lots of interesting extras that make it more useful as a computer. These include 4GB of RAM, a control touchscreen and a 500GB hard drive.

If you still want Office, Asus has a deal where you can get that for £241.48 or £257.94 if you prefer the Home version of Office 365. Not quite as amazing a deal as the Stream 11, but jolly attractive all the same.

Servers

These days, we're all creating vast digital collections, often without much thought as to where this information will ultimately go. If you're creating a massive film, music and photo archive, here are some cost effective places to put it all.

HP ProLiant Gen8 G1610T

MicroServer

Price: £179.94 (www.serversplus.com)

Part No: 712317-421

When HP added the Gen 8 G1610T to its range, it cost more than £350, but today you can get it for roughly half that price.

What you get for that money is a basic system using the Intel Celeron G1610T (dual-core, 2.3GHz, 2MB, 35W) processor, 2GB of RAM and slots for four SATA drives.

What you don't get is any bundled storage or an OS; those are for you to source yourself.

As a PC, this machine isn't very fast, but as a server, it's more than quick enough to deliver files to PCs in a home or small office. In the standard configuration, it comes with dual gigabit network adapters, a micro-SD card slot on the motherboard, seven USB ports (two of which are USB 3.0), eSATA and tool-free access to the internals.

Using the provided upgrade options, you can add a PCIe 2.0 x16 card or use both DDR3 memory slots for up to 16GB of memory. The drive bays allow you to mount 16TB of storage or even more if you use the new 5TB and bigger drives.

For anyone who wants a small server on the cheap and would like hardware built for the job, the HP ProLiant Gen8 G1610T MicroServer is wonderful value.

WD My Cloud 3TB

Price: £119 (WDStore)

Part No: WDBCTL0030HWT-EESN

For those that want an uncomplicated storage solution, Western Digital's My Cloud solutions are practically perfect. This device is a 3TB Western Digital hard drive mounted in an attractive book-like enclosure that you connect to your wired network and then access from your devices.

They don't need to be at home, as the My Cloud name suggests your files can be available at home and away. Setting up is relatively straightforward, and you can easily expand the system using the USB 3.0 port on the back.

A powerful little NAS box and 3TB of storage for less than £120 seems an offer that it is almost impossible to ignore.

Synology DS214se 2-Bay NAS

Price: £112 (Dabs)

Part No: DS214SE

Synology came from relative obscurity to dominate the small NAS box market with its amazing products. What's marvellous about its devices is that they all run the same Linux-based DSM OS, a platform that allows for massive flexibility in the services that you can run.

The DS214se is right at the affordable end of the Synology range but gives complete access to the wide application set that DSM currently affords. This is a dual-drive NAS and comes empty, ready for you to install any 3.5" SATA drives you wish to serve over a wired or wireless network.

For those that want to do more than just serve their files, the Synology DS214se is the right starting point, and at this price, most people could afford one. **mm**





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MAKE EASY MONEY FROM YOUR OLD TECH



Out with the old and in with the new.
David Crookes looks at the growth of recycling websites and explains how to maximise your gadgets' cash potential

We change our gadgets so often that, in the near future, we may cease to measure the passing of time in years but by the type of mobile phone we had in our possession. "Ah, I remember that Summer of iPhone 5 so well," we may one day gush, as memories of 2013 come flooding back. "It

was certainly better than that Winter of the Nokia 3210. Oh my, do you remember that?"

It may seem silly but there is no doubting our insatiable appetite for the new. Tech changes are fuelled by the mobile phone service providers who chuck free phones our way when a contract comes to an end, sped up by the annual

revisions to laptops, handsets and tablets, and driven by such overwhelming choice that – taking videogames as an example – you've barely got off level four before another eight or nine games queue up for your attention.

There is nothing wrong with moving forward, but it does lead to waste. At the last count, we are said to be buying 30 million phone handsets each year; we keep them for an average of just 18 months before upgrading to something new. As a result, so much technology gets stuffed in drawers or stashed in the loft that we forget there is money in



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FAQs

- Q How do I send my gadget?
- Q Is it broken or working?
- Q Why is my item not listed?
- Q Why isn't my gadget worth more?
- Q What if my phone's locked?
- Q Will I get more on eBay/trade in?
- Q How does the tool work?
- Q How are companies picked?
- Q What happens to gadgets?
- Q Why aren't charity sites listed?
- Q What about personal data?

“ The gold and copper from sim cards is sent to refineries to be smelted down ”

old rope: indeed, more than £6.86 billion worth of unwanted mobile phones are believed to be cluttering up our homes in the UK. So what should we be doing?

For many people, the answer has long been obvious: sell your item privately, hand it over to a friend, colleague or family member or stick it on eBay. However, over the last few years, one of the most popular trends has been to sell gadgets to a recycling company – and a large number of firms having emerged to help relieve you of your unwanted phones, tablets, consoles, laptops, games, software and other such goodies.

Many of these exist online. The likes of Fonebank, Mazuma Mobile, Simply Drop and the Phone Recycle Bank are quite happy to exchange electrical goods for cash, refurb companies like Gigacycle (www.gigacycle.co.uk), the sister company of Gigafurb, will deal safely with old computers and other IT equipment in line with the strict WEEE Directives imposed by the European Union, while ensuring

your data is destroyed along the way, and a good number of firms can also be found on the high street. Aside from stalwarts CeX and Cash Converters, retailers such as Game have been branching out. Not merely content with letting you trade-in games for cash or credit, Game has been snapping up customer's mobile phones and hardware. Even supermarkets are getting in on the act nowadays.

The way it works is simple. "We give our customers a price upfront for their item, send them some packaging and wait for them to send their item to us in the post free of charge," says Richard Mavers, Redeem's head of client marketing. "We then scan the item, send an email to the customer to let them know it has arrived and put it through a grading process, checking what they customer has told us against the actual condition of the item."

The amount of time a recycling company employee spends with an item varies depending on the type of gadget it is, with a timescale ranging from 30 seconds to four minutes. Smartphones take longer than dumbphones because of the software that is used, and the need to check that data has been cleared. Apple iPhones are the most tricky according to the recycling companies (no surprise there), with

Samsungs and Nokias proving easier to process.

"We do some internal testing and either give the agreed price or alter it, perhaps because the screen is smashed or there is something wrong with it," says Mavers. "We always communicate with that customer and let them know the price we are offering and they can accept or reject it. If they accept, the customer is paid but if they don't, it is sent back the same day for free."

Redeem is one of the main players in the recycling market, running a number of brands including O2 Recycle, Money4urMobile and Envirophone. It also has a corporate arm that buys equipment from large companies, banks and retailers. Its 300 staff deal with as many as 150,000 items each month and it has a turnover of some £70 million. What that shows quite starkly is that the business of buying your old kit is big – and very lucrative.

Then again, there is gold in them thar gadgets. Or at least some kinds of precious metals. After checking for faults, potential water damage and cosmetic blemishes, expensive handsets made by premium brands may be given new screens or replacement back covers to increase their value, but phones that are excessively damaged will be dismantled. Their batteries, camera modules, speakers and main boards will be removed and they will be most likely used to repair broken handsets that can then be sold on. Very old phones are mined, with even the gold and copper from sim cards being sent to refineries to be smelted down. Nothing is wasted and everything has a value.

"We assess resale value on the second hand markets," says Ashley Payne, director of Cash In Your Gadgets. "A lot of earlier phones, for instance, are sold to export markets and developing countries – around 80% of our sales are to Africa, the Middle East and Eastern Europe."

So how do you make sure that you are getting the best value? Well, it

“ That retro Game Boy phone case might well pay for itself ”

The screenshot shows the O2 Recycle website interface. At the top, the O2 logo is followed by the text "Recycle your gadget for cash". Below this are links for "Top Price Promise", "How It Works", and "FAQs". A search bar with the placeholder "Search for my gadget" and a magnifying glass icon is present. To the right of the search bar are icons for a user profile and a shopping bag. The main content area has a large blue header "Sell your gadget for cash". Below this is another search bar with the same placeholder and a "Search" button. A link "Or select my gadget from a list or by manufacturer" is also visible. To the right of the search bar is a cloud-shaped icon with a question mark and the text "How do I find my model?". The central graphic features a large, stylized blue mobile phone with a smiling face, surrounded by colorful confetti and smaller phone icons. To the right of this graphic, the text "One million gadgets now recycled" is displayed. At the bottom, a section titled "Most popular phones" shows four phone models with their respective cash values in red circles: "Get up to £68", "Get up to £95", "Get up to £50", and "Get up to £46".

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doesn't take long before you realise that the recycling market is incredibly fast-changing. Although digital camera, tablet and laptop recycling prices are rather static – laptop prices are often only altered every three months, during peak periods, trading in old phones can be similar to getting active on the currency market as prices can alter on an hourly basis. You can only get the best price as of the moment you search and it can be a gamble to wait even a couple of days. Timing is everything.

"It's all about supply and demand," says Mr Payne. "If a new product comes out, there will be rise in the number of old items being recycled. We anticipate this and we alter the price we pay downwards. Things then level off and become more static and the price alters again. You see this kind of fluctuation more with mobile phones. It's less of an issue with laptops or digital cameras, say, where new processors don't affect the previous generation that much, if at all – there isn't the same rush to sell older items; it only really has an effect on those who have a high-end use for their items."

So choose your moment. When a new iPhone or Samsung launches, lots of customers trade in their phones, which saturates the market. The best time to sell is in the lead up to a launch or a little while after when the market settles again. So, if you feel the time is right, how do make sure you get the best price for your item? That's easy enough: shop around.

More than 60 gadget recyclers have emerged online over the past five years and the prices they offer can vary wildly. Just as with the insurance market, comparison websites exist – like **MoneySavingExpert.com's MobileValuer** and **CompareMyMobile.com**. Searching for the value of a 16GB iPhone 5 shows just how prices can fluctuate – from as little as £40 with **fonehub.co.uk** to £107 with **funkymob** and Apple Recycle. A little bit of research can therefore reap dividends.

"The range of prices is simply down to the exit routes these companies have got," says Ashley Turner, co-founder of **CompareMyMobile.com**, referring to the ways in which the recyclers dispose or sell on the

Game On

Retailer Game doesn't just buy games from customers – it has branched into phones and gadgets too.

How important is the preowned market for Game and what revenue does it bring in?

James Taylor, spokesman for Game: We have a great trade in proposition which allows customers to trade in their unwanted videogames and tech in exchange for cash, store credit or gift vouchers, making buying new games and consoles even more affordable. On average 50% of Game customers buy preowned products and it is a great way to attract new fans into franchises at an affordable, entry level price point. Through our trade-in proposition we are able to stock a wider variety of games and consoles which are no longer made, creating the widest range of videogames for our customers.

Game had financial trouble a few years ago. Is revenue from pre-owned games essential in helping finance the company?

JT: Game Digital is a new company and operates under different management from the old Game and Gamestation brands of previous years. The industry is very much driven by demand and there is a lot of nostalgia and appetite for retro games. So, as the gaming industry continuously evolves, we need to enable as many gamers as possible to get involved and continue their gaming journey. Our trade-in proposition allows our customers to buy more games and newer franchises, and is recognised by publishers as a fundamental platform that allows gamers to buy more at launch. Our results show that around 80% of people who are introduced to a new franchise through preowned will buy a new edition of the game the next time round, all driving revenue into the gaming industry.

Why has Game branched out into buying mobile phones too?

JT: Game is dedicated to giving the gaming community the widest possible range of ways to play and in February 2014 began rolling out Gametronics sections in each of its stores. With an expanded trade-in offering, Gametronics is key to making gaming even more affordable to all gamers especially when purchasing more expensive items such as next generation consoles. Game already allowed customers to trade in products such as software, hardware and accessories and has now extended this further to include all kinds of tech such as mobile phones, laptops, cameras and sat-navs. The reason for this is that it gives gamers another way to pay and turn their unwanted phones or tech into cash or store credit that can be used to purchase against other gaming equipment they may need.

How are prices determined - is there discretion from shop to shop too?

JT: Stores have set prices for trade ins, but have discretion on tech trade-ins as the quality could affect the ability to re-sell. The prices are set on forecasted forward demand in the market. As you can imagine the demand for *FIFA 14* drops significantly once *FIFA 15* is launched. Game's Trade In Price Promise guarantees to match the trade-in price of other high street competitors within a mile. And if you actually find a better deal with another retailer, we will beat that by £1. For tech trade-ins we'll beat other competitors by an additional 5%. Of course, prices will fluctuate as new products are released onto the market.

Does eBay impact on buyers such as yourselves?

JT: No. We understand that a certain percentage of the trade in market is peer-to-peer on sites such as eBay but this doesn't impact Game. The majority of people that trade in for games and consoles do so to re-purchase new, so would come to Game. When it comes to other tech items such as mobile phones for example, people who trade these in will often want cash.

items they receive. "But customers also need to look at what companies want in return for your payment. One or two recyclers will pay you an extra couple of quid for a box and charger, for instance, and others will give a good price only for items in the best condition. You have to be very clear

what you need to have and do to hit a headline price."

Luckily there are some easy steps to maximising your item's potential. First of all, look after your items. "That rubber retro Game Boy phone case you bought for a fiver might well pay for itself,"

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explains Jonathan Cronin, CeX's brand and communications manager. "Our grading system pays more for working phones in good cosmetic condition and, as much as it's not needed you will often get more when selling if you've kept the box, instructions and accessories."

As we also explained earlier, you also should sell at the right time. "Sell early," Cronin continues. "If you're thinking of switching a Galaxy S4 for a Galaxy Note 4, you'll get a better price if you can bear to part with your existing phone a few weeks before the new one comes out then you would if you follow the market and exchange on release day."

The next step is to ensure your item is working for you. "Make sure your phone is unlocked or at least locked to the right network," says Mr Mavers. "We give less money for phones that are locked to Vodafone and EE as opposed to O2 because it costs our business money to unlock those phones. People can get more money by unlocking devices before they sell. Customers could get £20 to £30 more for a handset if they call their network beforehand and get them to unlock the handsets for free."

It is also important that you take the time to work out what it is you are selling. Many companies receive gadgets that are not what their customers thought they were and this may well

lead to an offer of less money. That said, few ask you to go into huge detail – usually just the make and model is sufficient. "This is one of our advantages over eBay," says Mr Payne. "When people are selling laptops, knowing what you have is not as easy as it may sound, but we only want to know the processor, whether or not the battery works, whether the charger is functioning and any damage the item may have. We ask very few questions."

Even so, there is a temptation to go direct to buyers through eBay. Guy Anker, managing editor of **moneysavingexpert.com**, says this is actually the best way to maximise the potential of a gadget. By searching for your gadget in the completed listings (under advanced search), you can assess the going rate.

An eBay sale will, Mr Anker says, add between 10- and 20% to the value that even the best recycler will give you. "Half the trick of eBay is knowing when to put it on. Get it right and you may get an extra £30 or £40."

Yet, as he concedes, it is not always that straightforward. As well as having to pay eBay and PayPal fees, there can unfortunately be a few unscrupulous buyers who will try and con you into parting with your handset with a variety of scams, typically wasting your time by trying to persuade you to deal off eBay. It doesn't happen all the time, but the

Used Up

The used market isn't universally popular. For years, the gaming industry rallied against the availability of trade-ins on the high street in retailers such as Game with David Braben, who created the BBC Micro hit game *Elite* telling Eurogamer that he felt used sales were killing off single player-only games because these were the titles most likely to be sold on when players have completed them.

It remains a hot topic: "it's not something we can actually comment on, unfortunately," says Jo Twist, CEO of the videogame industry body UKIE – and debate continues over the best time, in moral terms at least, for companies to buy and sell trade-in items.

"Trade-ins typically generate currency to allow new goods to be purchased," says games industry analyst Michael Pachter. "I think all of the manufacturers and publishers recognise and acknowledge that. But used goods offered proximate in time to the release of new items has the potential to cannibalise sales of the new items. I think the publishers are adamantly opposed to used games being sold within two months of a new game release but are fine with sales of the games after they have been out for three months or more."

Game, for its part though, believes it is doing the right thing for consumers. "Game offers customers value for money and giving customers the choice of whether they buy a game new or pre-owned is one way of doing this," says Game spokesman James Taylor. "Many customers choose to buy a pre-owned game and top up their purchase with extra digital additions."

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CeX Sells (And Buys)

We put the spotlight on Jonathan Cronin, CeX's brand and communications manager

How do you set your prices for gadgets you buy?

Jonathan Cronin: We set our prices to deliberately pay as much as we can to sellers. Our pricing team are geeks and gamers who live, sleep and would probably eat our products if we let them. We've over 22 years experience with second hand tech and games. We know the value of your old gear.

What can reduce the price of gadgets?

JC: In some cases a new generation of a product can reduce the value of previous generations, but that's not always the case. Our iPhone 5S prices remained fairly solid through the release of the iPhone 6. We want to offer choice, buying and selling all iPhone models released to date. Supply and demand are part of the picture. It's also true that if an item didn't sell well it might end up being rare and this can lead to it holding its price better.

What items are most popular for sellers and buyers?

JC: We turn over a ton of Android phones, almost as many iPhones, and the new generation of console software (PS4 and Xbox One) is proving massively popular among our customers.

Does the resale of gadgets harm the original manufacturers in any way, do you think?

JC: No. Many geeks sell their old equipment to fund that new must have gadget. They tell us that they're selling older products to us so they can afford to go out and buy new releases, which says to us that without that option those new releases would sell less. CeX gives a second life to perfectly good gadgets that would otherwise be wasting away in drawers and cupboards, or worse still being thrown away.

Does eBay impact your business? What advantage does CeX have over eBay?

JC: CeX is a totally different proposition to auction sites. For a start we have hundreds of stores across the UK as well as website. Selling to us is convenient and much faster. We are fair, giving the best cash prices to everyone, listed for all to see at webuy.com and we pay the same day in over 250 stores across the UK. CeX pays even more when you sell for CeX exchange vouchers.

Do you take steps to ensure the used items you sell are in good condition?

JC: Everything we sell is tested to make sure it works and comes with the peace of mind of a 12-month warranty. Buyers also have the security that they know we'll be here for them tomorrow. They get the ability to see and try out gadgets in store before they buy. We'd rather not sell something if it won't be right for you because we want your custom for the long run. CeX is independent which means our store teams aren't in the pocket of one manufacturer so you'll get honest, passionate advice from geeks who love working with gadgets everyday.

“ We haven't heard of many of our users haggling successfully ”

hassle of eBay can make recyclers appear a more attractive proposal.

“They are easier than eBay,” says Mr Ankers. “You have to make this call between ease and cash – I will sacrifice a bit of money and go for the ease, but others may take an extra £30, £40 and sell it on eBay.”

One of the downsides with online gadget recycling is that the prices are fixed and you only know how much you will get once the item has been tested. Given the slow mailing times, this could be more than a week after you sent it away. Surely, then, the high street recyclers are the best, because you are dealing direct with people rather than through emails and websites? Is there room to haggle?

“It's a personal choice whether you go to the high street or the internet and there is a potential to haggle if you are visiting in person,” says Mr Ankers. “But it didn't work for me personally at CeX and we haven't heard of many of our users haggling successfully. These companies tend to be quite rigid

so it's really about what is right for you: internet and jiffy bag, or a store.”

Some high street deals are better than you will receive elsewhere. Mobile phone shops, for instance, may give you a decent price on the day a new handset is released as they desperately try and get your custom (“It's a great sales tool,” says Mr Mavers. “And it encourages a sale by offsetting the price of a new device”). It is also worth considering accepting vouchers instead of cash. “The voucher is a marketing service that, say, Amazon or Argos will offer to get more customers to their website or store and they can pay around 10% extra,” adds Mr Mavers.

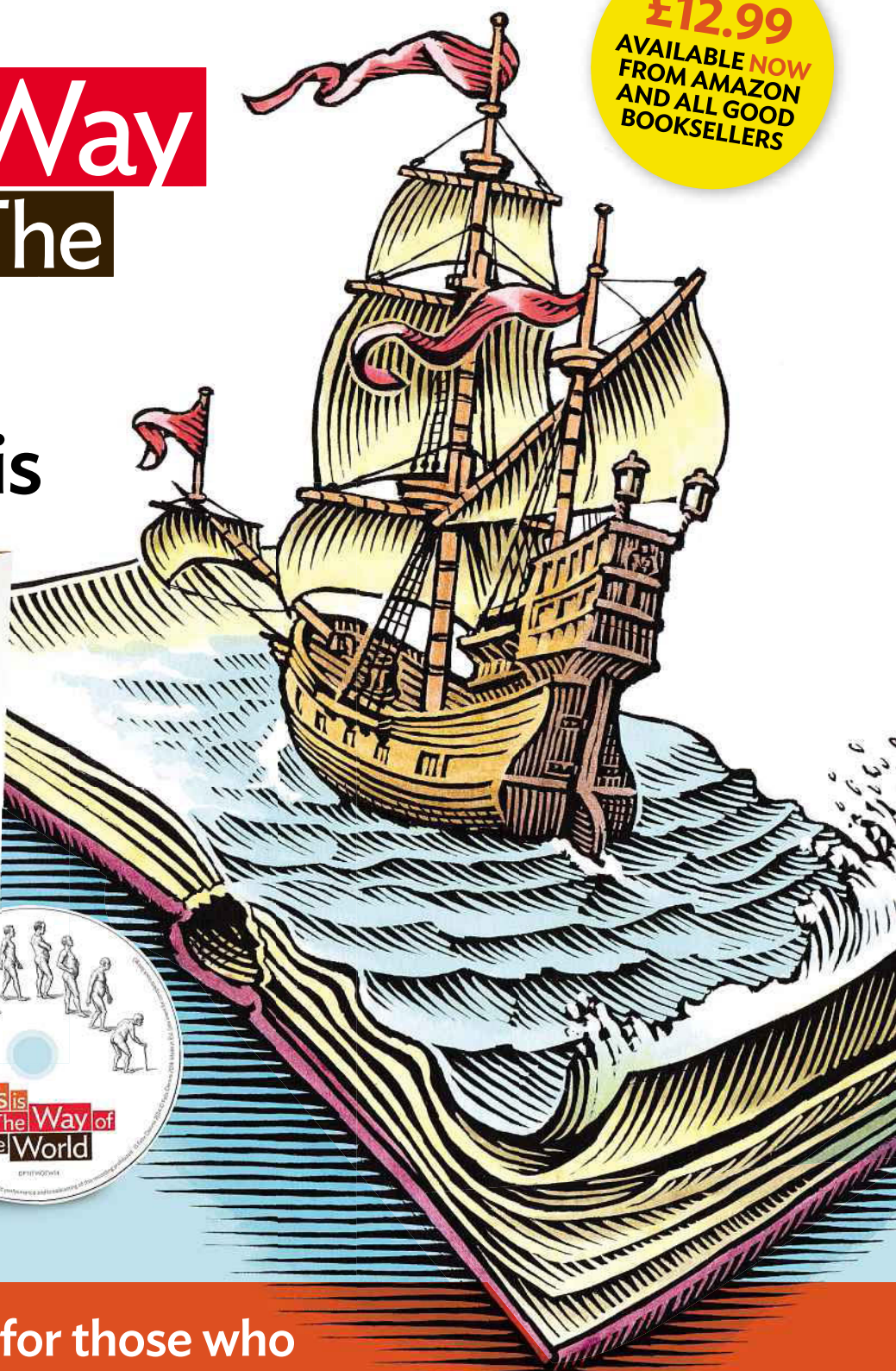
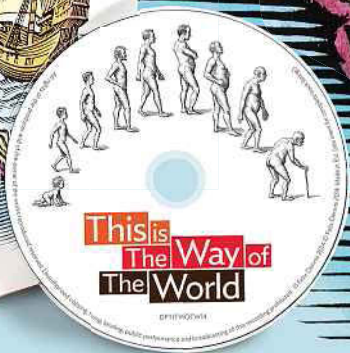
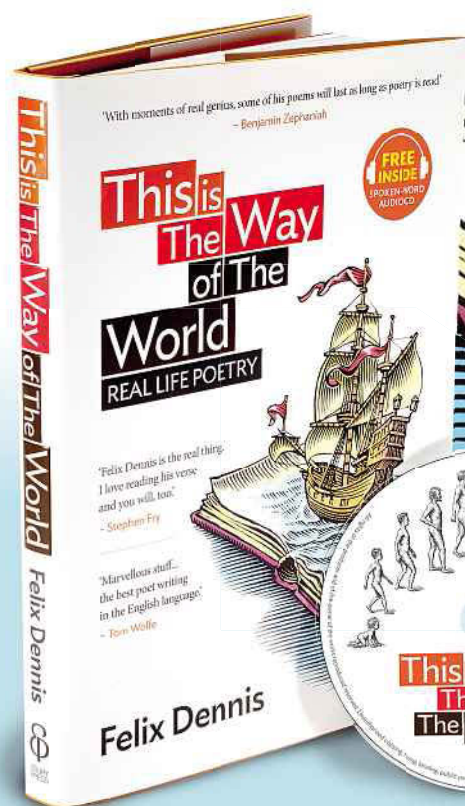
Whatever you decide to do, remember that “you're sitting on a cash cow”, as Mr Ankers points out. “Companies like Apple are geniuses for making us want the latest phone and as you upgrade, you really want to be selling the old one. Don't let gadgets gather dust unless you want it as a back up or to give as a present. It really is easy money.” **mm**

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ELITE, THEN AND NOW: A BRIEF HISTORY

David Hayward dons his ill-fitting flight suit and looks back at this historical game

Ask most BBC Micro users from the 80s what they remember most about gaming on this system, and the chances are they'll return with something along the lines of "trying to dock my spaceship in *Elite*".

Commander Jameson, along with his Cobra Mark III and having just 100 credits to his name, will forever be remembered in the history of gaming. *Elite* was technically brilliant and soon became the game that all space trading games were eventually measured against. But how did it all come about?

'A Bit Boring...'

Back in the early 80s, David Braben showed some of the 3D routines he was working on to fellow enthusiast Ian Bell. The routines themselves were great, and there was much potential in their design. However, the pair were, in the words of Braben, "quite tired of games at that time... I found them a bit boring, I suppose. Every game seemed to involve an extra life at 10,000 and shooting various shaped blobs in some way, often with some slight twist."

To some degree he was right, games had grown stagnant. At that time (around 1983) there were only so many Space Invaders, Pac-Man, Frogger and Galaxian variations you could stomach before you committed

your home computer to a shelf to gather dust. Of course, there were some startling exceptions in the 8-bit world, but the vast majority were basically following an already well worked theme of either copying Manic Miner-like gameplay or some other bestselling game at that time.

Why should you get an extra life at 10,000 points, the pair asked each other. Why not extra bullets or something else? Why not have the gamer choose what they want to spend their score on? "Why not just call it money and have done with it?" Braben says of the time. It was a fairly radical concept and one that ultimately paid off.

The Formation Of A Galaxy

In a recent interview with David Braben, as a part of the *From Bedrooms to Billions* extra footage, he spoke of how developing and programming a game yourself can allow you to remove the things about games that bore or annoy. And you can begin to incorporate those elements that avoid the pointlessness of, for example, shooting smaller ships, which are then replaced with bigger ships and so on.

It was this desire to break away from the accepted conventions of arcade gaming that led to the eventual formation of *Elite* and the galaxy in which it existed.

The idea of saving your position, customising certain elements of the game (such as the main character's name) and so on all stemmed from the desire to be different. The trading element, which Braben thought "sounds a bit dull", became the main focus of the game and the yardstick by which other games of this genre were then measured. Even today, a space trading game is often compared with the 1984 release of *Elite*.

However dull it was seen as, "it makes you care" is what Braben argues. It's a part of the game that cunningly lures you into the *Elite* universe and places your imagination firmly in the seat and at the controls of the Cobra Mark III. To actually feel pretty hacked off at arriving at a destination only to find that your cargo of platinum is now next to worthless is quite an achievement. It is just a game, after all.

There's a certain joy to be had, though, when you make a big score or when you're trying to protect your precious cargo from

“ Why not have the gamer choose what they want to spend their score on? ”

ELITE: THEN & NOW



marauding pirates. And then there's the thrill of having been cunning enough to see a gap in the market and to seize it. It all added up and played on the emotions.

The Elite

There's an interesting anecdote from David Braben regarding the naming of the game. In late 1982, the concept was a game called 'The Elite', where you would rise through the ranks to become this ultra-pilot, a member of a club of similar supreme commanders who no one could even come close to.

But due to the restriction of file name lengths and the fact you couldn't have spaces in them, the files on the disk were eventually just called 'Elite' and the name stuck.

A New Frontier

Fast forward ten years, and the long-awaited sequel to *Elite*, *Frontier: Elite II*, was released to an eager audience of gamers for the Amiga, Atari ST and DOS platforms.

Now playing as one of Commander Jameson's grandchildren, the player was set free in a digital interpretation of the Milky Way, complete with Newtonian physics, the ability to land on a planet, full colour graphics and something like 513,982,470 star systems, most of which

were randomly generated through some extremely clever coding.

A few years after *Frontier: Elite II*, *Frontier: First Encounters* was released. The third game in the series featured far better graphics, utilised the power of the PC available at that time and was the first game to ever use procedural texturing terrain and textures. There were also extra side missions and storylines to follow, so the emphasis on trading took something of a backseat over combat and exploration.

Unfortunately, both the *Frontier* games were plagued with bugs, which led to some rather unpleasant dealings with lawyers and such. Still, in the grand scheme of things the *Frontier* games' legendary status came from the players and not the bean counters.

Even More Dangerous

Last month, after an extremely successful Kickstarter campaign in January 2013, during which £1.5 million from a £1.25 million goal was raised, Frontier Developments released the fourth instalment of the *Elite* legacy in the form of *Elite: Dangerous*.

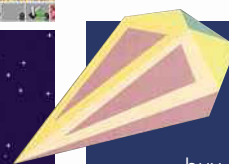
It's by far the most ambitious game released in recent years. Thanks to the power of modern PCs, *Elite* gamers can now enjoy exploring, trading, bounty hunting and completing missions in a galaxy filled with over 400 billion star systems.

With something close to 120,000 star systems taken from real-world astronomical readings and information gathered from the Kepler space telescope, the desktop pilot can visit worlds only previously possible in their imagination.

Where Next?

The *Elite* legacy is one that's firmly cemented into home computing history. But where next for Commander Jameson and his offspring and followers? Is a 400-billion-star galaxy big enough for the pilots of the next generation of home computing?

Who knows? But if David Braben or anyone else at Frontier Developments does, they're keeping it pretty close to their chest. **mm**



The Ships

Elite: Dangerous has numerous ships available for you to save up for and buy or to engage in combat should you so wish. The ships are a mix or evolution from all the previous *Elite* games and will more than likely be expanded on in time.

Sidewinder: A starter ship; light and responsive and a good patrol ship.

Viper Mark III: One of the fastest ships available and an excellent combat vessel.

Cobra Mark III: The original all-purpose ship, with a good balance of abilities.

Python: A tough cruiser and combat ship, but can be beaten by a good pilot in a modified Viper.

Anaconda: A huge, menacing-looking ship. Very tough. Don't face it alone and expect to survive.

Eagle: A light, short-range ship that's often used by bounty hunters and system patrol craft.

Federal Dropship: Heavily armoured and capable of carrying huge loads. Takes some beating.

Adder: A lightly armed ship that can carry more than the Cobra and Sidewinder.

Hauler: A freighter for traders, easy to take out.

Type 6: Another trade favourite, but with limited combat abilities.

Asp: An exploration ship designed for long-range missions. Light and quick in combat, but relatively weak.

Type 7: A slow moving freighter that can carry huge loads.

Type 9 Heavy: A much larger version of the Type 7; expect to make millions in trade with the right commodities here.

Orca: A kind of passenger ship that's often found in convoys with protection.

Imperial Clipper: Fast, tough and usually carrying something important. A target for piracy.

Your Letters

Ubuntu 8.04 LTS versus Windows 10

I enjoy tinkering with Linux between writing chapters of novels. Therapeutic! It's good that Micro Mart runs articles on Linux. In my last letter (Issue 1347) I had 'rescued' an AMD Sempron 2200+ from a trip to the tip. It ran Ubuntu 12.04 LTS perfectly except for two things; the wi-fi connection to the HP 6510 combo-printer and the FDD (Floppy – 1.44 MB – disk) didn't work.

Curiosity eventually overcame me. Was it possible to install the Linux HPLIP Ver 3.14.10 printer driver without resort to the dreaded "terminal"? HPLIP means "HP Linux Imaging and Printing System" if you didn't know! It worked well using some "auto" mode install, but wait for it; it installed all the files to the "desktop" and ran from there. Being a rather tidy chap, it bugged me, so I "trashed" it with inevitable consequences. No more wi-fi printing!

Undeterred, as I wanted to solve the FDD problem, I installed Ubuntu 10.04 LTS. Curious readers, read on! When you boot up with a Linux distro, (From magazine freebies or those "burnt" by you from .iso Web downloads), it is better to use the 32 bit versions on much older computers. The FDD would boot from a 1.44 MB floppy, (I still have "fdisk" and utilities

on a Windows 98 SE boot-up disk) but would not "read" or "write" to the floppy. In Linux arcane language, the FDD would not "mount," which in plain Windows language, means it cannot be "seen" in "My Computer." Very frustrating.

Undaunted, Web searches suggested that FDDs were not natively supported after and including Ubuntu 9.04. This proved correct, but other savvy Linux nerds suggested that the FDD could be "forced" to MOUNT. After trying many suggestions, including much "copy" and "paste" into the "terminal," I gave up. Why bother trying to get floppies working when USB drives made them obsolete years ago? Dear reader, it is the sheer challenge of computing, including Linux, that makes it worth while.

I replaced the FDD with a definitely good one. No joy! With little more time to spare, I installed Ubuntu 8.04 LTS. Eureka! The FDD "mounted" and "read" and "write" worked perfectly. Incidentally, when running one distro of Ubuntu, then installing another (Assuming you set the BIOS to boot first from the CD-ROM), use the option, "use the whole HDD," then you don't get confused with multiple partitions.

Hardy Heron (8.04 LTS) still performs most common tasks, although www.gmx.

com email was unsurprisingly not supported by the Firefox version installed. All this on a free Linux distro. What price Win 8.1? Triumphant, I stored the 14-year-old PC up in the attic, until I can bear to part with it. Meanwhile, I have partially tamed Mrs Erk's new Toshiba 15.6" Windows 8.1 laptop, but it runs far slower, owing to bloatware, than my Win 7 tower.

"Microsoft Windows 10" (Issue 1347) was an excellent article. However, are all free upgrades to Win 10 applicable to all 7/8/8.1 installs, namely pre-installed, OEM and retail? My desktop runs Win 7 from a legal OEM DVD which I purchased along with components, including the HDD. Am I eligible? More to the point, will I want it! I already have misgivings about Win 10, an OS that purports to run efficiently on all platforms. It smacks of Microsoft up to its old tricks, namely monopolising the whole computer software scenario.

What about migrators from Win XP and new customers? Consider this! Firstly, Microsoft's cosy deal with manufacturers should be broken. In other words, no more pre-installed or OEM deals. Let the customer decide the OS; Windows, Apple, Android, Linux, etc. Secondly, all devices to have a full retail total DVD disk supplied.

Thirdly, Microsoft to sell a KEY for the OS based on types of user. Say, £30 for install on three devices for home users – 64GB RAM maximum per machine; £100 for install on ten devices for small business – 128GB RAM max; negotiable for big business, banks etc – unlimited server RAM. With deals like these, piracy is pointless at £10/OS/machine and Microsoft would still make a fortune.

Now, where can I pre-order my £30 Windows 10 disk? Hang on a minute. Do I want all the rubbish as per "improved" Windows 8.1? No, I want something as simple as Ubuntu 8.04 LTS, and I suspect there are millions who think the same.

Tron Fisher

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Component Watch

Looking for a second screen that won't require a second mortgage? We got 'em...

Having a multi-screen system is a revelation when it comes to making your system feel (and look) powerful. The practical benefits of extra screen space is pretty useful too. In the past, multi-screen systems were too expensive to realistically go in the home – but that's no longer the case. To prove it, this week's Component Watch is looking at the cheapest monitors on the market. With these deals, even if you've got less than a hundred quid spare, you can have that second screen you always wanted.

Deal 1: HannsG HE195ANB
RRP: £80 / Deal Price: £62

Monitors don't get much cheaper than the 18.5" HannsG HE195ANB, which is currently available for less than £62 from eBuyer – which is a crazy price when you actually think about it. It's not exactly high-end, though: a 1366x768 pixel display, inexpensive TN-panel technology, 5ms response time and VGA-only connectivity make it a poor choice for gaming or watching movies on – but if you want more screen real-estate, say to have you email and chat apps permanently visible, there's little to complain about. One for those out there working from a home office, perhaps?

Where to get it: Ebuyer (bit.ly/1DlRJbu)



Deal 2: Acer G206HQLCb
RRP: £83 / Deal Price: £65

As is so often the case, if you're willing to pay just a few quid more and you can get a considerably better deal. The Acer G206HQLCb is a full inch larger corner-to-corner with its 19.5" diagonal screen size, and although it still has a TN panel and 5ms response time it's got a higher resolution of 1600 x 900, which is less than full HD but still far from shabby. Again, it's VGA-only, so it's not a high-end entertainment screen for watching your Blu-rays on. The £18 off RRP Ebuyer is offering makes it a bargain, and the extra capabilities you get for £3 make it more than worth splashing out on.

Where to get it: Ebuyer (bit.ly/1o6aQQQ)



Deal 3: Philips 196V4LAB2
RRP: £92 / Deal Price: £70

If you absolutely can't live without DVI, the 18.5" Philips 196V4LAB2 is one of the cheapest monitors around that incorporates it, but that does mean the resolution is back down to 1366 x 768. Still, this slightly more expensive monitor has additional features, such as SmartContrast, a mercury-free eco display and built-in 2x 2-watt speakers that make it a solid low-cost investment. If you can put up with the low resolution, it's feature set makes it worth the money.

Where to get it: Ebuyer (bit.ly/16hEYqq)



Deal 4: Acer G226HQLB
RRP: £94 / Deal Price: £75

If you want full HD you don't have to spend a lot more, though. This 21.5" screen has a resolution of 1920 x 1080 with both DVI and VGA input ports, a 5ms response time and a 160° viewing angle. That's a lot of functionality packed into a £75 monitor, and the huge discount makes it incredibly attractive – especially if you've got HD films to watch.

Where to get it: Scan (bit.ly/1HGxEDh)



Deal 5: Samsung S22D300HY
RRP: £99 / Deal Price: £90

Full HD capabilities are fine, but what's the use if there's no HDMI? The 21.5" Samsung S22D300HY means you can finally get a full package, 1080p monitor for less than £90. As well as Samsung's reputation for high-quality screens, this monitor also has a tilt ability that allows you to adjust its orientation – something cheaper screens often lack. A game mode, magic upscale and off timer complete the package. Objectively it's not fantastic, but at this price it feels it.

Where to get it: Ebuyer (bit.ly/1xV9xfi)





Music App Gets You In A Jam

Free app now available for iPhone

Dell Updates Mobile Workstation

Precision M3800 gets an upgrade

The world's thinnest and lightest 15" mobile workstation has been handed a bunch of updates to allow it to better service the video editors, graphic designers and other high-end users who it's aimed at.

According to Dell itself, the company has listened to its customers and has responded by bringing a bunch of new features to the touch-enabled M3800. Chief among them the inclusion of Thunderbolt 2

technology offering transfer speeds up to 20Gbps, a 4K Ultra HD (3840 x 1260) touch display boasting over 8 million pixels, a 4th-gen Intel Core i7 quad-core processor, NVidia Quadro K1100M graphics and up to 16GB memory.

If you're a power user and this sounds your cup of tea, and you have the money to spend (starting at £1,349 at the last time of looking), then www.dell.co.uk is the website to visit.



Raspberry Pi 2 Now On Sale

Beefed up board brings the power

The Raspberry Pi barebones PC goes from strength to strength with the release of the latest in its range, the Raspberry Pi 2.

The new board is on sale for \$35, which is the same cost as its Model B+ predecessor, as it happens, and it's a significant upgrade. Featuring a 900MHz quad-core ARM Cortex-A7 processor, 1GB LPDDR2 SDRAM, it's important to note that this has complete

compatibility with Raspberry Pi 1. Perhaps just as notable is the work undertaken to bring upcoming Windows 10 to the board, with details of a compatible version of the OS that's expected to arrive over the coming months.

We all know how popular Raspberry Pi has become, not least thanks to take-up by schools, and with the firm stating that this is six times more powerful for most applications, this is a significant upgrade indeed.



Magix has decided to take the sticky step of releasing its Music Maker Jam app for the iPhone. Previously available on other platforms, and downloaded many million times along the way, the app has been selected for iPhone release – and with it comes a fresh new look.

So, if music be your thing – and you are possessed of a burning desire to make professional-sounding tracks – this could very well be the next app for you to download. With over 70 style packages, countless genres and “spectacular” effects, interested users have unlimited creative freedom. Automatic tempo and harmony adjustment plus an eight-channel mixer make things a

snip for those without the need for any previous experience whatsoever. An improved home screen is included here, and first-time installation of the app offers four ‘lite’ style packages and the chance to combine a

bunch of genres, from hip hop through to movie scores, from the get-go.

Download from the App Store and give it a go, or read more beforehand by visiting www.magix.com.



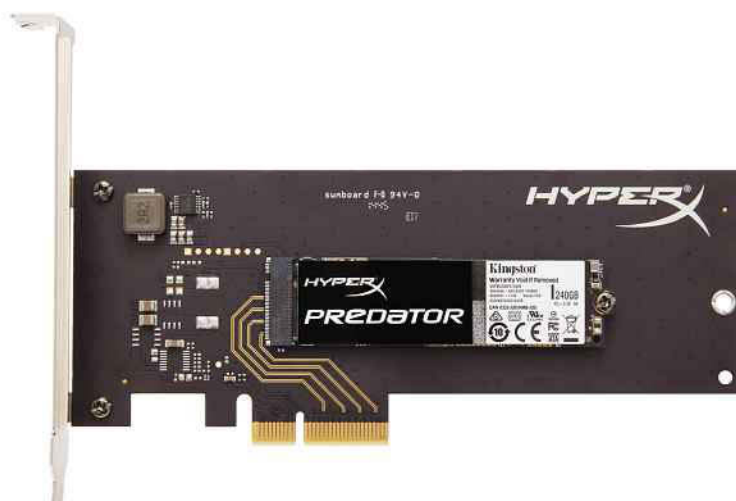
Fastest HyperX SSD Debuts

Kingston drives shipping now

Memory maker Kingston has announced the addition of the Hyper X Predator PCIe SSD to its Hyper X line, where it will become the top-of-the-range, with the fastest speeds in the line-up. Not only will it be faster than SATA-based SSDs, delivering speeds up to 1400MB/s read and 1000MB/s through the PCI-E interface (and thus offering superior multi-tasking), the new Predator will also offer large capacities (240GB or 480GB, with a 960GB version due later in the year). If you're interested, and frankly you should be, more details are over at www.kingston.com/hyperx.

Sticking to the Kingston theme for the moment, the company has also

announced its microSD UHS-1 Speed Class card with 90MB/s read and 80MB/s write speeds. The card is apparently intended for thrill-seekers, allowing the capture of cinema-quality Full HD, Ultra HD and even 4K2K videos on high performance devices. We're finished talking Kingston now.



We have tons of fantastic deals for you this week in our look at great value hardware, and combined with the kind of trade-in sites mentioned elsewhere in the mag, there's a chance you could get something essentially for free.

What you won't be buying, though, is a Steam Box or one of Razor's intriguing modular PCs. Why? Because, as Mark Pickavance points out, they're dangerously close to ending up as vapourware, promising us so much, but quite possibly never appearing in shops.

Of course, there are numerous reasons why products don't make it to market, and many times it's simply because there's not enough interest. Other times, it's because manufacturers are relying on the support of other companies, which never comes. Whatever the reason, though, it's hugely frustrating for consumers and, I reckon, damaging for the brands concerned. Let's hope at least one of these products is eventually available to buy.

Until next time,

Anthony

Editor

with Apple's record \$18bn for a quarter

Meanwhile... On The Internet...

Over the time we've put together this column, we've seen quite a few social media storms come and go. What's especially wince-inducing, though, is when you see a brand handle social media badly and bring a whole heap of negative publicity down on itself (not all SFW: tinyurl.com/Motl1349a). It often feels like you're watching a car crash in slow motion: you can see what's coming, but are unable to stop it – and, like many car crashes, it could probably have been avoided had things been handled properly.

So we think this needs to be said: if other companies are looking for advice on how to handle social media matters, they could do worse than look towards the PR team at Notts County FC as an example (www.nottscountyfc.co.uk).

You may remember the story from last week's News telling of how the club has blocked anyone from Hungary posting to its Facebook page (if not, it's here: tinyurl.com/Motl1349d), after the account became flooded with traffic originating from the country. The reason for the influx of posts was the club's signing of Balint Bajner from Ipswich the previous week (tinyurl.com/Motl1349b) – a well-travelled player who has a considerable following (mostly fans, but others not-so-much) in his native country and, it would seem, a pretty vocal one.

The club's blocking of a whole country made news headlines (tinyurl.com/Motl1349c) and was still in place when we went to press on the story last week. It may have seemed like a somewhat draconian measure, but as the PR team from the club explained to Team Meanwhile via email, it was a step they took to buy themselves a little breathing room.

"With the Saturday matchday and other Notts fans getting annoyed," a spokesperson said, "we had to take action. It was never our intention to keep the ban, just merely have a day's rest so we can evaluate and get a translator in place."

It was this decision to get a native Hungarian speaker involved that proved to be the real masterstroke, it would seem. With the translator, the club could "put specific messages out directly targeted to the Hungarian audience. By doing this, we earned their respect and, with a sense of humour, were able to ask them to stop the spamming."

After the game on 31st January, the club lifted the ban on posts of Hungarian origin (tinyurl.com/Motl1349e) and even began to post daily status updates in Hungarian too. These posts, aimed specifically at the 27,000 (!) new followers the club gained virtually overnight, asked that they keep any repeat posting of the 'no Bajner, no party' mantra, which had headlined the deluge

After waiting over a year to come to get as far as a courtroom, Ross Ulbricht's trial lasted less than a month – and it took a jury less than three and a half hours to convict him of creating and running the Silk Road website (tinyurl.com/Motl1349g). The conviction was actually for seven charges related to narcotics distribution and conspiracy to violate narcotics laws, conspiracy to run a 'continuing criminal enterprise' (a so-called 'Kingpin' charge, as it involves supervising at least five other people), conspiracy to hack computers, distributing false identification and money laundering. He faces at least 30 years in prison when he's sentenced (that's expected to be in a month or so), but he could end up getting a life term.

It's expected that there will be an appeal, however. Ulbricht's lawyer called for a mistrial no less than five times but was turned down every time (tinyurl.com/Motl1349h).

of traffic, strictly within the comments section of those posts. "We said if they were to spam, only do it on the daily Hungarian status'. Those who continued to troll, we removed."

The approach has not only calmed down the postings, which appeared to be coming from Facebook groups dedicated to the player, it also won the team a whole new set of fans – not only in Hungary itself, but from the Hungarian community based in the UK. "A large proportion loved our approach," the club said, "and since then we've had online shirt sales, and we hope to have over 100 Hungarian Magpies at Leyton Orient v Notts [in London] on Tuesday [10th Feb]. We now have a brand new market to approach, and we hope to have Hungarians at Meadow Lane in the next couple of games too. The power of social media, hey?"

The club's approach is brilliantly simple: pause to take stock rather than making a knee-jerk reaction, look to engage with the people causing the problem directly, use a sense of humour, ban as a last resort. Easy to say, not so easy to do – and all the more impressive as the PR team insists that none of them have ever had to deal with anything like this before. What's more, while they were aware of similar goings-on at Bajner's previous club, Ipswich and did receive advice from its social media custodians, they had no idea the reaction would be so strong.

As if to cement their standing as social media experts, as soon as *Micro Mart* reader and County fan @kagey60 tweeted a pic of our original story, the PR team responded and quickly sought to put the story straight with us. Hence this article. Class dismissed!

.AVWhy? Videos For Your Eyes... Not Necessarily For Your Brain

If you fear that in the next week or so you're going to be required to sit through the new *50 Shades Of Grey* movie, we just may have the thing that will make it bearable. Apparently, the *50 Shades* movie we actually need, is not the one we will get; it's actually the Lego version, vividly imagined in trailer form by YouTube hero Antonio Toscano (youtu.be/S7AvZPTT4kU).



Social media didn't work out so well for Coca-Cola this week, after its #MakeItHappy bot (a twitter bot that turned negative-sounding tweets in cutesy ASCII art) got tricked by those tricky tricksters at Gawker Media into quoting a fair chunk of Hitler's Mein Kampf using its own @MeinCoke bot. Some people just can't have nice (albeit cynically marketed by mega-corporations using automated procedures) things, can they (tinyurl.com/Motl1349f)?

Aaaaaaaaand Finally...

The viral stars of the week were definitely Katy Perry's dancing sharks. Not only did they totally steal the show during her Superbowl half-time extravaganza, they stole the hearts of the web as well (tinyurl.com/Motl1349i), and they have broken out onto the chat show circuit in their own right (tinyurl.com/Motl1349j). They certainly 'nailed it' (tinyurl.com/Motl1349k).

Caption Competition

"Damn, I forgot to insert the SIMian card"



No, it's not a tech journalist updating his dating profile; it is, in fact, time for the results of our caption competition!:

- **Alan Cox:** " 'To be or not to...?'"
- **Thomas Turnbull:** "We're both using Skype; it's a big improvement over Jungle drums"
- **Thomas Turnbull:** "It's okay, mother I've ordered the bananas from Amazon like you asked."
- **Zakala:** "...yes you and everyone we know; this *Hamlet* job's harder than I thought!"
- **Daniel Sparks:** "Forget the Any key; I've found the Mon-key."
- **Rob Carver:** "I knew these opposable thumbs were for more than peeling bananas."
- **Al Beaumont:** "Bobo's 'new laptop' joy turned to despair when he realised he didn't have a plug socket."
- **K Smith:** "This screen is giving me a headache, but there are no aspirin in the jungle, because the parrots eat 'em all!"
- **Terry Martin:** "Even out here, there's dodgy 'Free Public Wi-fi'"

Thanks, all, and congratulations to our winner, Chris Masters with "Damn, I forgot to insert the SIMian card."

To enter this week, head to the 'Other Stuff' section of our forum (forum.micromart.co.uk) and say something funny (but not too rude) about the picture below or email us via caption@micromart.co.uk.



Jay Z To Launch His Own Music Streaming Service?

Watch out, Spotify!

If press reports are to be believed, Jay Z is looking to take on Spotify, Deezer and the rest. Chatter tells of how his company, Project Panther, has put in a bid to acquire Sweden-based Aspiro for what's reported to be \$56m. Aspiro owns the WiMP and Tidal services and Tidal, in

particular, is notable for its access for 25 million tracks and 75,000 music videos.

This is all quite plausible, as Jay Z is rather rich; his estimated worth being around \$520m in 2014, this \$56m is a drop in pool. Aspiro has published a press release on the offer so it seems likely that this will go ahead.

Sky To Become Quad-play By 2016

O2 deal done

Sky has teamed up with O2's parent company Telefonica in a deal to use its mobile network, and will begin offering its own mobile services in 2016.

This is significant as it will mean a quad-play service offering for Sky – mobile, fixed-

line phone, broadband and TV services. This deal won't be affected by any acquisition of O2 by Three and for anyone already worried about the steady eradication of competition within the phone arena, this may not be particularly welcome news.

Snippets!

Virgin Broadband Win

The uSwitch broadband awards have been completed for another year, the fourth year of the awards, in fact. The winners were voted for by 3,000 consumers and Virgin Media won three of the 12 gongs on offer including the big one, Best Broadband Provider.

Virgin was praised for its superfast speeds, high level of customer satisfaction and reliable connection. Other winners included Plusnet for Best Customer Service and London-based, landline-free provider Relish, which bagged the Best Broadband Innovation award.

LibreOffice Updated

Open source office suite LibreOffice has been updated to such a degree that the suite's developers are now calling it "the most beautiful LibreOffice ever."

It has indeed been handed a wide-ranging visual refresh as menus, toolbars and status bars have all been included under the upgrade, making for easier navigation. The OS X version, in particular, has a new monochrome theme by default and various features have been tweaked to give consumers more reasons to climb aboard the already popular suite.

Gates' AI Concerns

Bill Gates has lent his views on artificial intelligence during a Q&A session on Reddit, and he's not feeling very rosy about it.

Gates said that: "I am in the camp that is concerned about super intelligence. First the machines will do a lot of jobs for us and not be super intelligent. That should be positive if we manage it well. A few decades after that though the intelligence is strong enough to be a concern."

Noting that he "doesn't understand" why some people are not concerned, Gates obviously sees a potentially dangerous future with AI. Gulp.

World's Smallest Game Of Chess

But will it make it any more interesting to play?

Well here's a nice story. A coder going by the name of Baudsurfer has designed a truly wonderful game by managing to fit a playable computer version of chess on a single 487-byte file. Well done, that man.

Baudsurfer posted the game online in a bunch of formats – Windows, Linux, OS X, DOS and BSD – and it is indeed playable if you hunt it down. By all accounts the built-in AI is rather poor, then again we're not all that good at chess at the best of time... So, y'know...

Hey, let's not bicker and argue. This remains a mighty achievement, capturing the excitement of chess in a 9 x 10 character text display.

Next week, someone will attempt to code a teeny, tiny version of *Arkham Asylum*. Or probably not.

Settle Your Debts With Gmail

Google Wallet comes to UK

Already in place in America for months now, Google's Wallet service is now being integrated into Gmail for UK users.

What this means in practice is that you can send, for free, payments to people from within your desktop Gmail account, and the recipient doesn't even

have to have a Gmail address. The integration itself is seamless, with users clicking on a '£' icon that will appear in emails and then simply type in the amount they want to send.

Users will need to set up a Google Wallet Balance to begin with that's linked to a debit or credit card and money in that Balance can be sent by

Gmail, spent in the Google Play store, or transferred directly to a bank account. Google's statement on the matter notes that this is coming to the UK within the next few weeks so keep an eye out.

Unfortunately, this does mean that there is one less excuse now for being in debt with your mates...

Sega Cuts Its US Workforce

How the mighty has fallen...

Remember when Sega was a big deal? Remember when its consoles were much sought after and the brand was generally considered to be a significant player in the gaming industry?

Those days are long gone, and by way of proof, news has emerged that the firm is going to be cutting its workforce in a bid to focus more on digital PC and mobile games. Sigh.

Sega's titles such as *Crazy Taxi* have already proven to be a

hit on mobile platforms, and it's worth noting that it does still have a significant title on its hands with the ever-present *Football Manager* franchise. It's nevertheless still sad to hear of a once-great gaming force on the wane, though.

Twitter To Roll Out The Changes

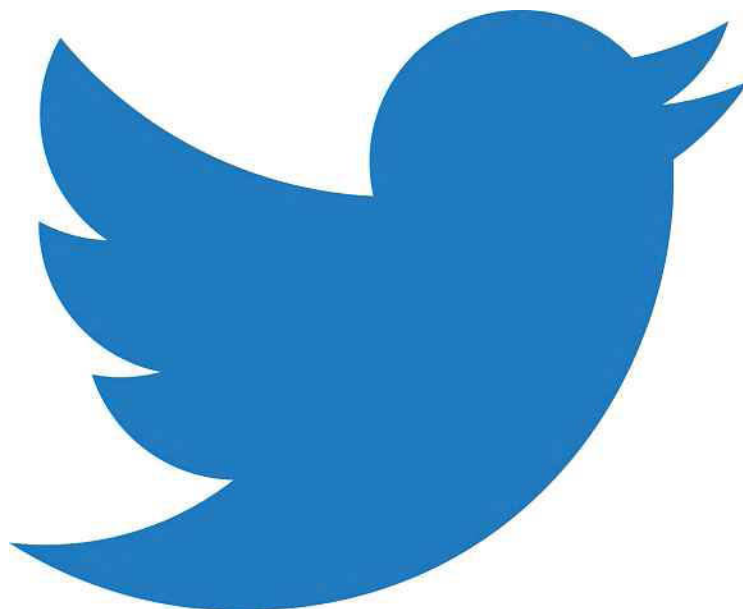
Group messaging and video sharing on the cards

A blog post from Twitter suggests that some big changes are afoot in the service, with group messaging high on the agenda.

Yes, the chance to send banal comments to a whole host of people is soon to be at your fingertips thanks to a Group Messaging function that will be made available from within the Direct Messages section. Users won't have to follow each other

to be in the same group conversation, which allows up to 20 people at one time. The micro-blogging platform is also going to allow video capture and inline editing from directly within its mobile app – and 30-second videos will be sent directly from within the timeline.

This has been rolled out with high-profile backing, as the first tweet using the mobile camera feature was sent by Oscars' host Neil Patrick Harris. Swanky.



Original Piece Of EDSAC Unearthed

US discovery significant for TNMOC

A very rare, original part of EDSAC has cropped up in the States, suggesting that other bits of it may be dotted around the world.

EDSAC was, of course, one of the first computers, and the part that's been found is a chassis that

has been kindly donated to the EDSAC team in residence at The National Museum of Computing. There, you'll witness for yourself an ongoing reconstruction of EDSAC which is expected to be complete by the year's end.

The chassis itself, which as you can see for yourself is

pretty distressed from corrosion and has broken wiring all over, was likely snapped up at an auction of parts in Cambridge during the 50s and the man behind TNMOC's reconstruction project, Andrew Herbert, thinks that there's every chance

that this discovery could mean that other parts are in existence and that they "could even be in the Cambridge area stored away in lofts, garden sheds and garages."

Now that would make for a rather brilliant *Antiques Roadshow* episode, wouldn't it?



Raspberry Pi 2

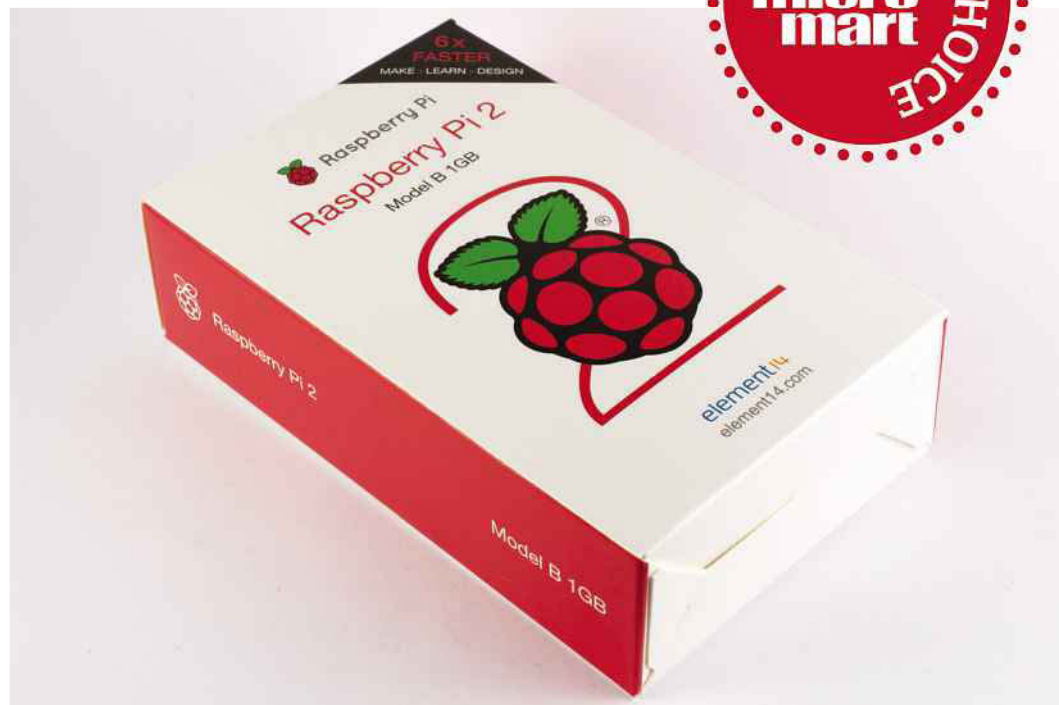
The new Pi appears to be a considerably tastier prospect...

DETAILS

- Price: £30
- Manufacturer: Premier Farnell/RS Components
- Website: www.raspberrypi.org
- Required spec: HDMI display (VGA, DVI, composite via adapters), USB keyboard and mouse, wired Ethernet network, 5V 2A USB

The launch of the Raspberry Pi back in 2012 was something of a phenomenon. The first batch produced sold out in minutes, with demand crashing the website of manufacturer Farnell and retailer RS Components despite the early-morning launch schedule. Since then, the project – founded with the aim of producing low-cost computing hardware for educational and experimental uses – has gone from strength to strength, with the Raspberry Pi Foundation claiming world-wide sales of 4.5 million to date.

In the years since launch, the Foundation has released cut-down variants, models with more efficient power circuitry and enlarged interface capabilities, and even an ultra-compact version designed for industrial use. Each of these, however, used the Broadcom BCM2835 processor of the original launch model. Designed for use in set-top boxes and long-outdated even in 2012, the BCM2835's single-core 700MHz processor and ageing ARMv6 micro-architecture have long been a thorn in the side of anyone trying to use a Pi for CPU-bound tasks.



That's where the Raspberry Pi 2 enters the picture. Launched this week in Model B variant, with a Model A (lacking all but one USB port and without on-board networking) planned for the future, the Raspberry Pi 2 is the first outing for Broadcom's new BCM2836 system-on-chip design. Built specifically to power the next-generation Pi, the BCM2836 ups the clock speed to 900MHz from 700MHz, packs four individual processing cores where the original had but one, and uses the newer ARMv7 micro-architecture. In short, it's a not-inconsiderable upgrade.

The launch couldn't have come at a better time. While the Pi launched into a market where rival development boards cost anything up to ten times the £30 launch price, alternatives appeared thick and fast once the Pi had proven a success. Many of these cost the same as the Pi,

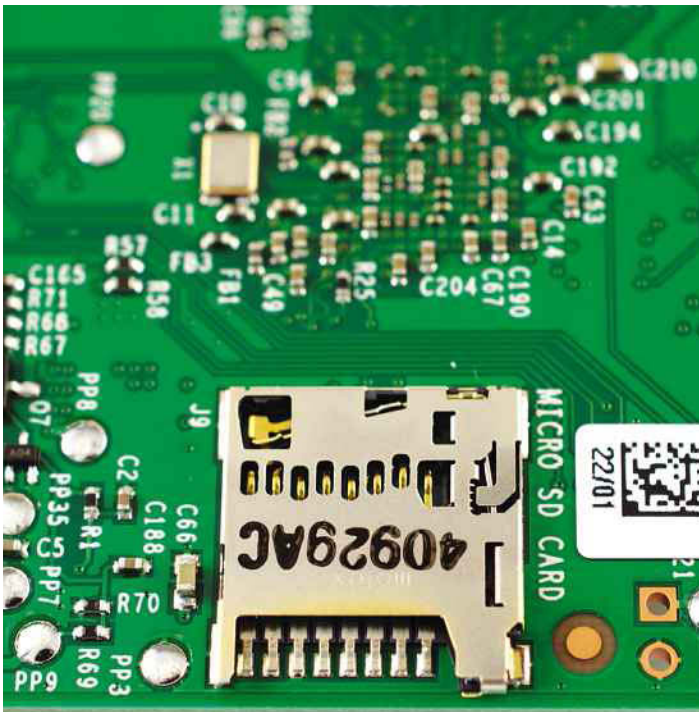
“ The Pi 2 is the first outing for Broadcom's new BCM2836 system-on-chip design ”

or slightly more, yet offer more advanced hardware such as dual- or quad-core processors, high-speed SATA storage connectivity, or USB 3.0 ports. Had the Foundation stuck with the BCM2835, the Pi risked obsolescence despite an enthusiastic community of fans.

If you're not paying attention, it'd be easy to mix the Raspberry Pi 2 in with its predecessor. While the launch of the Raspberry Pi Model B+ (a naming convention borrowed from Acorn's BBC Micro family) brought with it a revised board design with enlarged 40-pin general-purpose input-output (GPIO) header, the Raspberry

Pi 2 is largely unchanged. The biggest difference, silk-screened labelling aside, is a shift away from the package-on-package (PoP) format that saw the SoC and RAM sandwiched together on the top side of the board; instead, the Raspberry Pi 2 places the new SoC on the top, while the enlarged 1GB RAM module is slung on the underside of the board.

That change aside, however, the new Raspberry Pi 2 will be immediately familiar to anyone who has used its predecessor. The 40-pin GPIO header, used to interface with external hardware including add-on boards dubbed HATs,



is still in-place and offers full compatibility with existing accessories. Unfortunately, this also means there have been no improvements on that front: there's still no analogue-to-digital (A2D) or pulse-width modulation (PWM) capability built in to the board, meaning more advanced hardware interaction will still require the use of an external device.

The Raspberry Pi 2 launch isn't about dramatic redesigns, though. That becomes immediately obvious by looking closer at the software. The ARMv7 micro-architecture of the new chip is backwards-compatible with the ARMv6 original, and the stock Raspbian Linux operating system boots happily on either device with no changes aside from an ARMv7-compatible kernel image already present in the latest release.

Everything else runs without recompilation, and at a considerably improved speed. The new micro-architecture brings with it the promise of wider compatibility with

other software packages, too: Canonical's Ubuntu is now supported on the Raspberry Pi 2 in the form of its Snappy Core variant, marking the first Ubuntu release for the platform, while Microsoft has – to the surprise of everyone – announced that it will release a version of Windows 10 for the board later this year completely free of charge.

Even without these new operating systems and the possibilities they bring, the Raspberry Pi 2 proves a tempting upgrade. The Raspberry Pi Foundation claims that the new version is six times faster than its predecessors, and benchmark testing bears that out: using the SysBench CPU test the new model actually came out 6.7 times faster, while a compression test using the multi-threaded PigZ package showed a seven-fold performance boost. For multi-tasking, especially at the desktop, this translates into a far smoother experience with none of the delays and hitching

suffered by earlier models. Power draw is the trade-off, measured at nearly double that of a Raspberry Pi Model B+ – but, interestingly, only slightly higher than the original Raspberry Pi Model B.

Not everything will be faster, of course. The Ethernet port, which will be removed from the Raspberry Pi 2 Model A when it launches later this year as a means of cutting costs, remains a 10/100 model connected to the system via a single shared USB channel. While it's fast enough in benchmarking, measuring at the same 89Mb/s throughput as earlier Raspberry Pi models, using the Ethernet port at the same time as one or more of the four USB 2.0 ports results in a considerable reduction in throughput. The USB ports themselves are also still limited to 1.2A total power output, far below the 2A a standards-compliant USB 2.0 implementation should really offer.

These niggles, present in previous releases and uncorrected in the Raspberry Pi 2, are undeniably annoying but far from a deal-breaker. The Pi's low price, launching at £30 and only dropping since, made it the go-to board for education despite its drawbacks; the new Raspberry Pi 2, despite its massively improved processor and doubled memory, launches at the same attention-grabbing price – something that its competitors, without the Foundation's close ties to chip-maker Broadcom, will struggle to beat. **mm Gareth Halfacree**

Evolution rather than revolution, but a handy upgrade nonetheless



Microsoft Lumia 635 on Vodafone

Vodafone pitches a 4G phone that most people can afford

DETAILS

- Price: Free on monthly plans £12.50 or higher, or £60 PAYG
- Manufacturer: Microsoft
- Website: shop.vodafone.co.uk

I'm not sure why Microsoft bought Nokia. Whatever the reason, its masterplan appears to have face-planted, given the share of the mobile market the pairing has managed to grab. However, if we ignore that fact, and treat the Lumia products like Nokia's previous feature phones, they suddenly seem much more attractive. This thinking would also put the Microsoft (Nokia) Lumia 635 design at the very heart of Microsoft's mobile strategy because, having seemingly given up on 'flagship' designs that can challenge the iPhone *et al*, the brand has been heading to the bargain end of the market at speed.

This is a redesign of the Lumia 630 model, where the design brief appears to have been to add 4G(LTE) capability and change little else. Because of this, it shares the same 1.2GHz Qualcomm Snapdragon CPU



with Adreno 305 GPU, 512MB of RAM, 8GB of Internal storage, a 5MP Autofocus camera and an odd resolution 854 x 480 4.5" ClearBlack Display.

Or, that's how the spec sheets read, anyway. In reality, once I saw the 630 and 635 next to each other, it became obvious that this is a much better phone in a number of critical ways. The most obvious of these improvements is the display; it's brighter and has a distinctly richer palette than its predecessor. Unfortunately, though, the downside to the display and LTE improvements is that both features impact on battery life,

and therefore the 635 won't last as long on a charge unless you tweak brightness down and disable 4G when not in use. The feature that impressed most, though (especially given some phone makers' track record in this respect), is that this design lets you insert a microSD up to 128GB in size to supplement the modest internal storage.

Vodafone, as appears to be its policy these days, have laid very gentle branding hands on the Lumia 635, with only a few apps that would differentiate this from the vanilla product. My only related complaint is that the device comes with OS version 8.10.12397.895, which was released by Microsoft way back in June 2014. There have been eight subsequent releases, adding all manner of fixes and features, none of which Vodafone has chosen to pass on. That means there are no 'Denim' OS enhancements, like the UK version of Cortana for example.

Networks need to realise that when people ask in their support forums when these updates will appear, telling them that they don't discuss firmware release



dates just isn't good enough these days, and actually rather insulting. What's more, Microsoft should quickly change the way Lumia works so that it upgrade the OS directly, not the network providers, because otherwise it'll just annoy the relatively small number of customers who use these devices.

This is akin to a curious, but generally useable, feature phone. However you slice it, though, a 4G compatible device you can buy for less than £69, or have free on a minimal monthly contract, is something of a bargain, really. If you take the plunge, and at some point Vodafone and Microsoft manage to turn it into something more than that, then that will be a bonus. **mm Mark Pickavance**

Fantastic value 4G smartphone if you can ignore the old OS version

Key Specifications

- **Display:** 4.5"
- **Processor:** 1.2GHz Qualcomm Snapdragon 400
- **Front Camera:** No
- **Resolution:** 480 x 854 pixels
- **RAM:** 512MB
- **OS:** Windows Phone 8.1
- **Internal storage:** 8GB
- **Expandable storage:** MicroSD (128GB Max)
- **Rear Camera:** 5MP
- **Flash:** No
- **Battery capacity:** 1830mAh
- **Colours:** Bright Green, Bright Orange, Black, White



WebSite X5 Evolution 11

An easy to use Web design package that doesn't need any programming skills

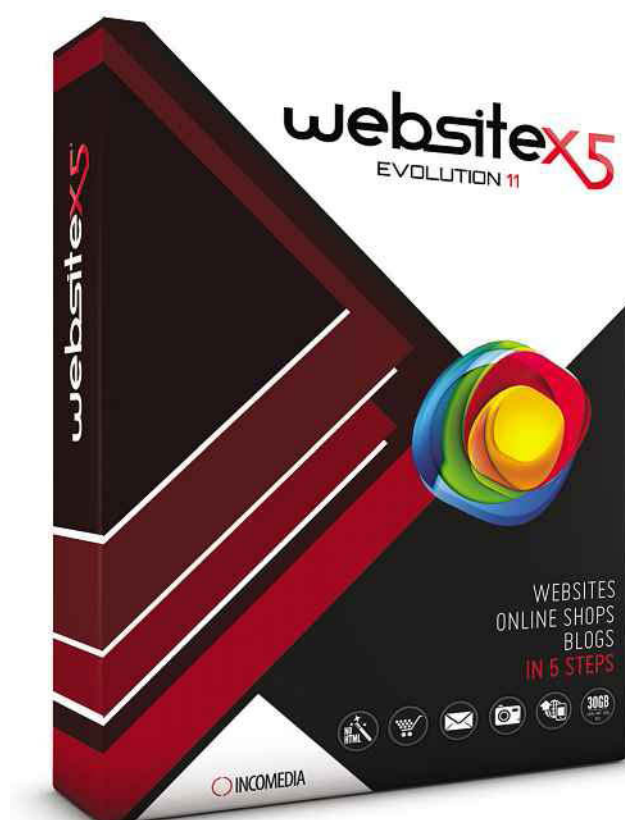
DETAILS

- Price: £0-£170
- Manufacturer: Incomedia
- Website: tinyurl.com/njtsth7
- Required spec: Windows XP (SP3), Vista, 7, 8/ 1 GB RAM/ Screen resolution of 1024 x 768

The last time I looked at WebSite X5 it had a somewhat dated look about it, with an interface badly in need of an overhaul. In fact the best way to describe it was, 'clunky'. However, I'm pleased to see that Incomedia are obviously a forward thinking company, because they've addressed some of these issues with a new release.

WebSite X5 is available in five different versions, each one designed to accommodate the different requirements of its users. These range from a completely free version – that allows you to create a simple website of up to 10 pages – to a professional version, incorporating over 1500 templates that are also mobile ready, and comes with 12 months free web hosting. In between these are Evolution, Compact and Home versions, with features and templates commensurate with their price.

This review is based on the Evolution product, aimed at the semi-professional or home designer who wants a slick and professional looking website, but who doesn't need the extra facilities that comes with the Pro version. Although just one step down from Pro, I feel Evolution represents good value. It has most of the Pro features and comes with Web Hosting for 12 months, but at almost a third of the price.



As I said earlier the interface has had a complete overhaul, giving it a more graphical style, while retaining the simplicity that the program has always been noted for. One of the major improvements being the addition of live previews for most of the elements you're working on, with the facility to change text and move it around on top of the page section you're working on.

This encourages you to try different fonts and effects, because you can see the changes as you work. Having said that, it's still not exactly a WYSIWYG environment – you have to go to a full page preview to see the final results of your editing – but I have to admit that, after using it for a few days, this slightly unorthodox method is growing on me. What I should make clear is that this approach provides

much tighter control of the page elements, and almost infinite ways of changing the look, style and content.

The workflow is pretty much the same as in previous versions: you go through a tabbed list of forms that define the detail and overall layout of your website. During this process you have the option of starting from scratch or using one of the massive range of templates provided. These, incidentally, are infinitely customisable both in their layout and content, to the point where the finished site has very little in common with the template it was derived from. You also have access to an equally impressive catalogue of 200,000 royalty free images that you can substitute for those within the templates, or use to enhance them.



Part of the package allows visitors to your website to download an app, which is available for free for both iOS and Android devices. With that they can receive all your latest news and offers directly on their smartphones and tablets.

This update to WebSite X5 is certainly worthwhile and, as I've mentioned, before this program (above most others I've reviewed) creates very compact and efficient code. The upshot being that your website loads quicker and reacts without any lag when selecting different elements or flipping between pages.

If you want to try the product for yourself, the Incomedia website has a 14-day trial version which is free to download. There's also a range of video tutorials to get you started that supplement the comprehensive manual.

mm Joe Lavery

A very comprehensive product pitched at realistic prices



Corsair Gaming Sabre Optical RGB

Corsair releases a new high-precision gaming mouse

DETAILS

- Price: £52
- Manufacturer: Corsair
- Website: gaming.corsair.com/en
- Required Spec: Windows 8, Windows 7, or Windows Vista

Corsair has built a solid reputation for gaming peripherals over the past few years, and has had much success with its Vengeance and Raptor Gaming mice. This new addition to its ranks, the Sabre mouse, comes in two flavours: a cheaper 'Optical' model (reviewed here) and an insanely high-DPI 'Laser' version.

What I liked about the Sabre Optical from the outset was the shape. This is a really clean form, where your fingers fall naturally on to the buttons. Corsair has also coated the upper surfaces in a rubberised material, so you should remain in control even when the action heats up.

Adding to the look and feel are four LED illumination points that, as the 'RGB' moniker hints, can be selected from a full 16.7 million colour palette. Not really sure this looks as good as it sounds on paper, because subtle colour changes aren't obvious

or especially representative. To make these exact modifications you need to install Corsair's Core Utility Engine software. That, though, doesn't come in the box so you'll need to download it to get full use out of the Sabre.

Gamers, I've observed, are generally looking for slightly more than shape and aesthetics. With this in mind, there are two further aspects that really help with the sell: the range of sensitivity, and the quality of the switches that Corsair has mounted under those all-important buttons.

The sensitivity of this mouse is exceptional, using a sensor that can register

a 6200dpi movement. The typical problem with having a mouse this sensitive is that the move from the sensitivity level beneath that to the highest is just too much for many gamers. Corsair has solved this problem, by giving the Sabre five different DPI settings, and using its software to let the user decide what they are. This way if you're comfortable with 5500dpi, but 6200dpi is too much you can dial it back. And likewise, if you don't care for 400dpi at the other end you can make the lowest setting better suit your taste. By default two buttons are allocated to adjust DPI, and one of the LED lights changes colour to give you an immediate feedback about what speed you've set.

This is just one of many ways in which you can customise this mouse, though, because just about every aspect can be tweaked. Include in that list: button assignments, the lighting, macro operations and even the polling rate – for the record, USB is usually polled at 125MHz, but this mouse can handle 1,000MHz or 1 msec. As I also

- Three-zone 16.8 million colour backlighting
- 6,400dpi optical sensor and multi-colour DPI indicator.
- 8 programmable buttons

mentioned, the button actions are really clean and positive, as Corsair used top notch Omron and Avago micro switches beneath them.

If I have a real criticism of this design, I personally found it a little light at just 100g, and it could do with some weights like Corsair's Vengeance M60 has. The feature set seems reasonable for the price, and with a bit of link clicking I was able to find it for 20% less than the quoted price, which makes it even more enticing a prospect.

The Sabre Optical RGB is a precision tool that many gamers would love, though those wanting even more sensitivity might want to consider its Sabre Laser stable-mate. That comes with an 8200dpi sensor for roughly an extra tenner, if you feel you really need that extra precision.

mm Mark Pickavance

A very precise, lightweight and comfortable gaming mouse



JBL Clip

Mark's love of all things musical shines through this JBL Clip review

DETAILS

- Price: £40 (John Lewis/Currys/Argos)
- Manufacturer: JBL
- Website: uk.jbl.com/jbl-homepage-uk.html
- Required spec: Bluetooth or audio device with 3.5mm Jack



The market for ultra-portable rechargeable Bluetooth speakers is growing, I'm told. Some confirmation to this assertion came when my student daughter asked for one, so that her music can follow her around without the need for pesky headphones. This is exactly the sector that JBL is targeting with the 'Clip', a device which resembles an old style pocket watch, unaccompanied in this instance by a tardy white rabbit in a hurry.

This might seem an odd shape for a speaker, but why it was chosen quickly became apparent in some of JBL's marketing images. The Clip is meant, through the integrated karabiner, to be attached externally to a backpack or similar bag.

This is perfect for those who feel that their musical choices are so excellent that they need



to share them with everyone else, so they may experience those life changing tracks in that exact order. Exactly how

noisy it can be, though, is thankfully limited by what you can do with a single 40mm driver that is rated at 3.2 watts. Also, it can only run for a maximum of five hours (or less if the volume is set high) and recharging takes at another two hours, with a 0.5A Micro USB charger (not supplied). Connection is via Bluetooth or an integrated audio jack cable, and for those using it from their phone there is the added benefit of it functioning as a hands-free kit through an answer button and microphone.

The device is built to withstand some abuse, built

as it is around some especially dense plastic forming a double injection housing. Although JBL don't mention any water resistance for those who like music on the beach, even if the device does look made for precisely that environment.

Audio output seems impressive for the size of the Clip, though I'm sure audiophiles would probably eviscerate the limited frequency range and inherent distortions it brings with it. What I can say is that it is significantly louder than most phones, and reduces the impact on the playing device's battery by generating the sound so it doesn't have to. Beyond that I don't have the ears or equipment to validate its musical credentials.

The price appears to be what the lower end of Bluetooth portable speakers are going for, even if this reviewer thinks it is slightly more than they're worth. You can get cheaper ones, but probably not as robustly made as this one is.

For those who feel the need to be colour coordinated with their peripherals, JBL are offering the Clip in red, blue, grey, black and purple.

mm Mark Pickavance

A small portable Bluetooth music sharing speaker

Clip specifications:

- **Support:** A2DP V1.2, AVRCP V1.4 (iOS 7 compatible), HFP V1.6, HSP V1.2
- **Transducer:** 1x 40mm
- **Rated power:** 3.2W
- **Frequency response:** 160Hz – 20kHz
- **Signal-to-noise ratio:** >80 dB
- **Battery type:** Lithium-ion polymer (3.7V, 600mAh)
- **Battery charge time:** 2 hrs @ 0.5A
- **Music playing time:** up to five hours (varies by volume level and audio content)
- **Dimensions (H x W x D):** 107mm x 88mm x 42mm
- **Weight:** 150g



Box.co.uk Turbo+ Gamer System

In need of an affordable gaming PC? Then look no further

DETAILS

- Price: £600
- Manufacturer: Box.co.uk
- Website: goo.gl/gvVFCT
- Required spec: USB keyboard and mouse, suitable display, network connection

Despite the rise of the here today, gone tomorrow internet PC suppliers, there are still some excellent system builders around who take great pride in their systems, while still offering the best quality components at a reasonable price.

Box is one such system builder and, as you've no doubt viewed in the pages of *Micro Mart*, there's a high degree of craftsmanship and attention to detail here that sets Box aside from the vast majority of others treading a similar path. We recently managed to get our hands on the Cube Turbo+ Gamer System from Box, and were more than happy to put it through its paces.

At its heart there is an Intel Core i3-4160 dual core 3.6GHz CPU with an MSI Z87M Gaming Series Micro ATX board complete with 8GB of Hyper-x Fury 1866MHz memory, and a Seagate 1TB hard drive with Windows 8.1 pre-installed.



Graphics come courtesy of the brand new MSI Nvidia GeForce GTX 960, with 2GB of RAM and which boasts a rather impressive 1190MHz GPU core up to 1253MHz with the boost technology. Outputs come in the form of a single HDMI and DVI port, along with three DisplayPorts, and of course there's the option for a two-way SLI.

The guts of the system are packed into a Cooler Master K281 Gaming Case, which provides more than enough room for the current system components as well as plenty of internal space for expansion.

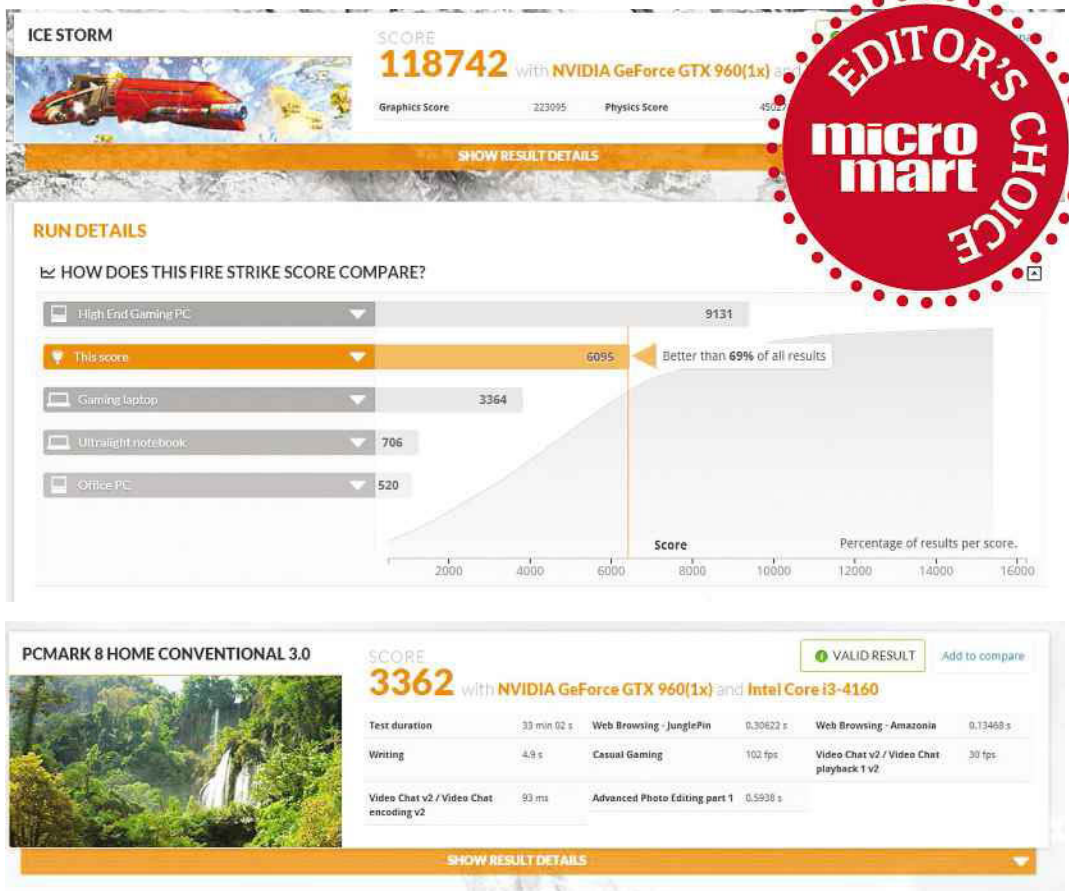
The chassis of the K281 is one we're quite familiar with here, and has already proved itself to be more than capable as a quiet, yet accessible case that's

optimised for cooling while still remaining quite stylish. There's also space inside for another 120mm fan, located on the front of the case, to compliment the already present pair of 120mm fans. In addition, and powering all this lot, is a Cooler Master Elite 500W PSU, fitted at the bottom of the case above a slide-out dust filter.

The choice of processor and motherboard is a good combination in this case. There's enough processor grunt in the i3-4160 to create a stable and exceptionally quick machine, and the choice of MSI board makes for an excellent base upon which to build a gaming system. Both components are reasonably priced as well, which helps keeps down the overall system overhead. Plus, the MSI board features some of the best quality, military grade components too. Solid caps, a better layout, and better



“ There’s enough processor grunt in the i3-4160 to create a stable and quick machine ”



There's really very little to fault the Box Turbo+ Gamer System; perhaps the inclusion of an SSD as standard for the system drive would speed things up considerably, although to be fair the system is pretty rapid to begin with, and an SSD would also increase the end cost by a considerable amount. However, there's always the option to include an extra component here and there through the Box Turbo+ site, if you really feel the need to up the ante a little.

We were impressed with the Turbo+ Gaming System. An excellent machine, that benefits from a good choice of components and an eye for detail that you would normally have to pay considerably more for.

mm Mark Pickavance

An expertly built and designed gaming system for a very reasonable price



overclocking potential make for more appealing system all round, we think you'll agree.

The graphics card, we felt, was a bold decision on the part of Box. The GTX 960 is distinctively a mid-range card that's designed to sit neatly between the upper echelons of the GTX 970 and the previous generation GTX 760; but it's also one that's relatively still unproven in gaming circles. That said, it's an impressively built card. The twin Frozr V fans do a superb job of keeping the card cool and quiet, and the 2GB – which seems small in the

“ An eye for detail that you would normally have to pay considerably more for ”

shadow of 4GB and above cards these days – does a remarkable job of keeping up with the latest games without a hint of performance lag.

In terms of the benchmarking side of things, the MSI GTX 960 scored a decent 6095 in 3DMark

11, which isn't too shabby at all. Furthermore, the entire system managed a PCMark 8 score of 3362, which again is a pretty good result.

The external aesthetics and benchmarks aside, the internal layout of the Turbo+ has been expertly configured to allow maximum airflow and access to core components. There's a distinct level of quality and care on display with this system, as we said at the beginning, a higher than the norm standard of craftsmanship. Remarkably though, all this can be had for only £600. That's a very reasonable price considering what you get, and the quality of the components you're getting too.

Features:

- Intel Core i3 4160 3.6GHz dual core processor
- HyperX 8GB Fury memory 1866MHz (2x 4GB)
- MSI Nvidia Geforce GTX 960 video card
- MSI Z87M Gaming motherboard
- Seagate 1TB hard drive
- Cooler Master K281 case + 500W Cooler Master Elite PSU
- Windows 8.1 64-bit
- Two-year warranty

GROUP TEST

2GB Graphics Cards

Graphics cards are evolving all the time, which naturally means the ones that were top of the range a year or so ago have now dropped in price significantly.

The technology of a year-old graphics card is still pretty good and can cope with most daily desktop duties, plus a little gaming. David Hayward has been testing six 2GB cards this week. Which one will come out on top?

2GB Graphics Cards

Gigabyte GT 610

DETAILS

- Price: £34.50
- Manufacturer: Gigabyte
- Website: goo.gl/BKHPCI
- Required spec: PCI-e 2.0 slot, 300W PSU minimum

The Gigabyte GT 610 is one of the cheapest 2GB Nvidia GeForce cards we've ever seen. At around £34 (depending on where you shop), it's certainly worth considering. But there are some areas of concern that must be addressed before you go out and buy one.

It's an upgraded version of the GT 520 from some years ago, and it even uses the same GF119 GPU but without the unlocked features. It's not based on the Kepler GeForce design, as was expected when the GT 610, 620 and 630 were released; instead the 610 is actually based on the Fermi 40nm GPUs that saw a tour

of duty in OEM laptops and desktops before being used in these examples.

The GT 610 has an 810MHz core clock, with a 1.3GHz DDR3 memory clock, alongside 48 shading units, eight texture mapping units and a TDP of 29W. As you would expect, it's a PCI-E 2.0 64-bit card with HDMI, DVI and VGA outputs that can, theoretically at least, throw out a maximum resolution of 2560 x 1600 across a pair of monitors.

Naturally, this is a single-slot, low-profile card, so it doesn't require any extra power connectors. There's a single cooling solution in the form of a heatsink and small fan, which is slim and won't cause too much interference in smaller cases.

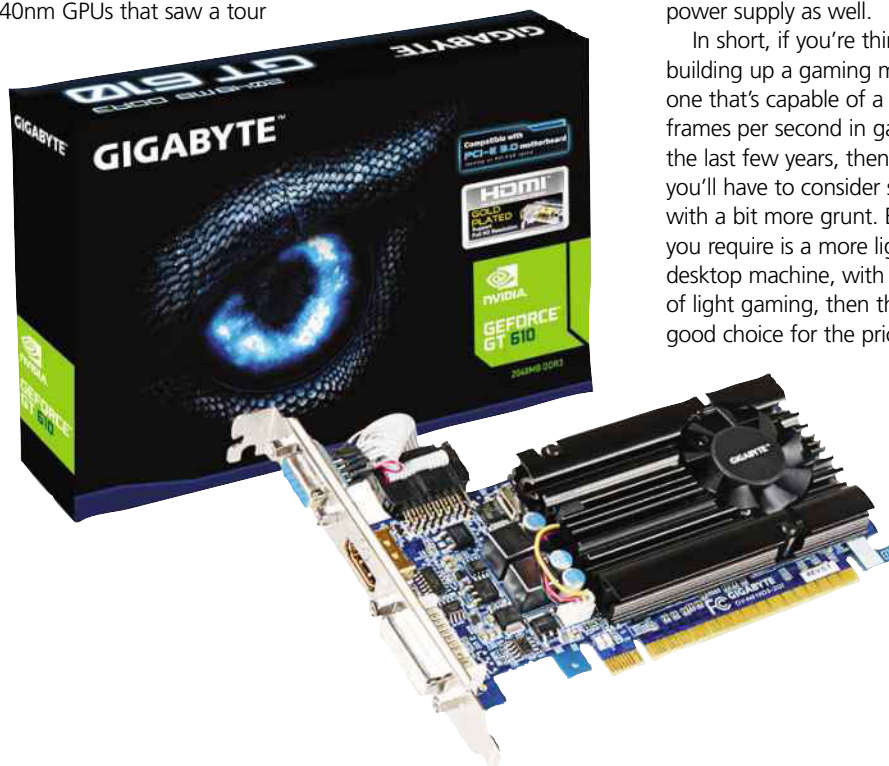
On paper, the Gigabyte GT 610 is a perfectly capable card, and to some degree, it is in reality. However, the remarkably low 3DMark score of 560 means that you'll be struggling to get any decent graphics from most, if not all, of the latest games.



Still, it's ideally suited for normal desktop duties. If your PC is going to be used for general surfing, image manipulation and light video editing, then this card will offer a much needed boost beyond a motherboard's on-board graphics.

Also, if you've set up a small, low-profile media centre, the GT 610 will certainly suffice and deliver good HD quality media without breaking into a sweat. In fact, for just £35, it's not a bad selection for those of you who build low-cost media centres to sell on, and you can get away with a relatively low-cost 300W power supply as well.

In short, if you're thinking of building up a gaming machine, one that's capable of a good frames per second in games from the last few years, then sadly you'll have to consider something with a bit more grunt. But if all you require is a more lightweight desktop machine, with only a bit of light gaming, then this is a good choice for the price.



Asus HD 5450

DETAILS

- Price: £36.36
- Manufacturer: Asus
- Website: goo.gl/0XQ0G8
- Required spec: PCI-e 2.0 slot, 300W PSU minimum

Standing pretty much toe to toe with the GT 610 is the Asus HD 5450. This is another extremely low cost 2GB card, costing in the region of £36, and as before, it has one or two drawbacks that need to be considered.

The Radeon HD 5450 range of cards were released way back in 2010, making them at least two years older than the GT 610s, which in computing terms is an absolute age. It uses the Cedar Pro variant of the Cedar GPU, with a core clock speed of 650MHz and memory clock of 450MHz. There are 80 shading units, eight texture mapping units, a TDP of 19W, DVI, VGA and HDMI outputs.

Again, it's a low-profile, PCI-e 2.0 single-slot card with

passive cooling in the form of a stylish looking heatsink spread across the tiny Cedar processor and memory. The lack of a fan makes this card a little quieter than the GT 610 but only slightly.

The maximum theoretical display is 2560 x 1600, which certainly sounds tantalising. Running anything at those resolutions on this card, other than looking at your desktop, is

going to be a bit of a chore for the poor thing, though.

The poor 3DMark GPU score of just 330 means that you'll be lucky to be able to run any of the games released within the last decade. With standard desktop duties, though, it does perform slightly better. Very basic photo manipulation is acceptable and, to a point, some video editing. Once you get into more graphical heavy

work, though, the HD 5450 begins to noticeably struggle under the load.

We also found HD content struggled somewhat too. There were brief moments of pixelisation and screen tearing as well as some Flash problems on YouTube. In all honesty, we were convinced at one point that we were using the older 512MB version of the card instead of the more meaty 2GB variety.

Indeed, the Asus HD 5450 is a low-cost, card and its low-profile, silent running would certainly appeal to the casual buyer. In practice, though, the HD 5450 is a pretty poor performer. For a few pounds less you could have the far more capable GT 610, which is roughly the same size and only a tad noisier due to the fan – and that could probably be circumvented with a little creative thinking.

So although the Asus HD 5450 may look to be the equal of the GT 610, it's not. Where the engineering processes went wrong, we're not sure, but this card doesn't deliver anywhere near as good performance as the previous card of equal standing. If it's more performance you're after, then you'll have to spend a little more, otherwise save a couple of pounds and opt for the GT 610.



2GB Graphics Cards

MSI GT 730

DETAILS

- Price: £55
- Manufacturer: MSI
- Website: goo.gl/tmbjh8
- Required spec: PCI-e 2.0 slot, 300W PSU minimum

MSI is something of the leader in terms of graphics card technology. Its products are cutting edge, utilise the best components and more often than not include some extra feature or two that benefits the customer and keeps the competition on their toes.

The MSI GT 730 is certainly no exception. This is a relatively modern card, being released early last year and built on the 28nm process. It's based on the Nvidia GK208 graphics processor, with a core clock speed of 700MHz, 2GB of DDR2 memory at 1800MHz, 384 shading units, 16 texture mapping units and a TDP of 49W. So you could essentially get away with a lower-end 300W PSU if needed, although we'd recommend one with a little more power to factor in the other components.



This is a dual slot, PCIe 2.0 card with a large heatsink and MSI embossed fan. The HDMI, VGA and DVI ports offer a maximum resolution of up to 4096 x 2160, with support for DirectX 12 games.

The benefits of this MSI version over other makes available are the all solid capacitors, the Afterburner overclocking utility and the MSI Predator video capture tool. Although they may not sound overly exciting to some users, these extra features all combine to make up a more complete

package and one that has been subjected to a higher level of scrutiny and attention to detail.

The 3DMark GPU score was 1550 – far a more satisfying compared to the previous two cards we ran the test with. This of course means you'll be able to enjoy some of the more recent games without too much of an issue, and you may even be able to get away with the likes of *Elite: Dangerous* or *Dying Light* on medium settings.

Naturally, standard desktop duties were handled without any hint of a problem, while video and photo editing went at a far quicker pace than anything we'd tested to this point. You could even ramp up the video editing to include more complex and longer edits with more features, and we're pretty sure the GT 730 would cope well enough.

As you would expect, watching HD video was perfectly fine. The only problem you might have is the dual slots taken up by the card and the slightly elevated noise levels. If you're fitting this into a smaller

case, then it's worth checking the dimensions and power requirements beforehand.

All in all, we were quite pleased with the MSI GT 730. It performs very well indeed, it's reasonably compact enough for a decent-sized case without getting in the way of any elaborate cooling of other components, and it's a good price too. At around £55, depending on where you shop, the MSI GT 730 is certainly a better value card than the previous two examples. You get significantly more for your money, and it'll make more of a positive impact on your system.



Asus R7 240

DETAILS

- Price: £59.99
- Manufacturer: Asus
- Website: goo.gl/CT0MqS
- Required spec: PCI-e 3.0/2.0, 300W PSU minimum



The Radeon R7 240 from Asus sits roughly on a par with the MSI GT 730. Both cards cost more or less the same, and both deliver some excellent visuals considering they're classed as entry-level hardware.

The Asus R7 240 was released early last year and is based on the Oland Pro graphics processor from AMD. It uses the same GPU as the HD 8670, which itself was an unlocked version, but in this case, some of the shading units have been

disabled, bringing the total to 320.

The GPU clock speed runs at 730MHz, with a boost clock speed of 780MHz and memory clock at 900MHz (1800MHz effectively). There are 20 texture mapping units, five compute units and a TDP of 30W, meaning no external power source is required.

This is a low-profile card, which is quite a surprise after using the similarly powered MSI GT

730 in the previous test. You still get HDMI, VGA and DVI video outputs, along with a low-profile heatsink backplate, and it's easy to fit into most compact HTPC type cases, thanks to its slim profile heatsink and 37mm fan.

As with the MSI card, the Asus R7 240 features some higher-quality components than you would normally find on a lower-end card. There are solid capacitors, a dust-proof fan and a GPU tweaking utility to help get the best performance from the card. All this, of course, adds up to make a decent package and one that we're happy to say doesn't suffer from the common misconception that AMD cards are far more underpowered compared to their Nvidia counterparts.

The Asus R7 240 managed a handsome 3DMark score of 2400, nearly 900 points more than the GT 730. While it may not sound like a huge step, it does mean that gaming on this card is slightly better, and you could most likely get away with playing more recent games at a medium setting and lower resolution.

Likewise, standard desktop duties, as well as photo and video editing, were a breeze for this card. Plus it's worth mentioning that thanks to the low-profile design, there's more scope for a better media centre or PC living room entertainment machine if you take into account the reasonable level of gaming you could squeeze out of the card.

There's a lot going on with the Asus R7 240 that we like. It's slim enough to be a valuable addition to a HTPC, it can handle some modern gaming, and it's also a neat and quiet package. We also like the fact that it costs just £59.99, which is only £5 more than the GT 730.

In the end, it all boils down to whether you prefer Nvidia over AMD. On paper, they're pretty much the same, and if we haven't tested them, we would, admittedly, have thought the GT 730 would come out on top. We were wrong, however, and it just goes to prove that you can have decent graphical power from a low-profile card.

“ Goes to prove that you can have decent graphical power from a low-profile card ”



2GB Graphics Cards

Asus GTX 760

DETAILS

- Price: £194
- Manufacturer: Asus
- Website: goo.gl/tlpHcQ
- Required spec: PCI-e 3.0/2.0, 500W PSU minimum

Moving up towards higher-performance cards, we have this entry from Asus, the GTX 760 – or to give it its full title, the GTX 760 DirectCU II OC Mini. It's a very capable card and, but it's also one that's nearly £200. But is it worth that amount?

The GeForce 760 GPU used here is from the GK104 processor line, as featured in the slightly older GTX 680 model. One of the main features of this GPU is the Nvidia Boost Technology, which takes into consideration the current temperature, power

and the graphical load on the GPU, then boosts it as it sees fit, but keeping within the limit of the card's tolerance.

The core clock is 1006MHz, with the boost in ideal conditions moving it up to 1071MHz, a 4% increase on the standard GTX 760. Additionally, there are 1152 shading units, 96 texture mapping units, a TDP of 170W

and 2GB of GDDR5 memory at 1502MHz.

It's a dual-slot card but one that's slightly smaller than the norm, hence the Mini aspect of its full title. The smaller footprint allows it to be fitted into a mini-ITX case, but it's certainly not lacking in power and performance.

Connectivity comes in the form of a pair of DVI ports, a single HDMI and a single DisplayPort. Since we're now in the realms of the more powerful graphics cards, it's lacking a VGA port. Legacy users may well be cut out from the equation here, but at least other users will relish in the fact that triple-monitor computing from a single card is now possible. And the two available SLI connectors mean you can splash out considerably more and enjoy some quad-SLI graphical wonder.

The 3DMark score of 8640 means you could probably throw any game going at this card on its maximum settings, and it'll quite happily take it. In fact, we'd be surprised if you didn't hit the semi-magical 60 frames per second on any of the games you play with this card. Suffice to say,

it's more than capable of high-end gaming.

Naturally, then, standard desktop duties, as well as photo and video editing, are nothing the GTX 760 needs to get worked up over. We're only amateur video editing enthusiasts, and everything we tested it with worked a treat, so we'll go out on a limb and say it's likely that the GTX 760 can take on something more professional looking.

Despite its obvious power and performance, we didn't much like the amount of noise that was dished out from this thing; it was significantly louder than anything else we'd tested so far. You would assume that this amount of power will create more heat, so the large 100mm fan will work more. However, the DirectCU II dual-blade setup, along with its vapour chamber, is supposed to lessen the noise levels, but it doesn't.

That aside, this is a terrific card, but it's also one that costs on average £194. That isn't cheap, but you do get some great capabilities for your money, and with this being able to fit into a mini-ITX case, there's plenty of scope for an amazing gaming and media PC.

“ It isn't cheap, but you do get some great capabilities for your money ”



Asus R9 270X

DETAILS

- Price: £145.90
- Manufacturer: Asus
- Website: goo.gl/t5Q80F
- Required spec: PCI-e 3.0/2.0, 500W PSU minimum

The last card on test is another from the substantial Asus range. Its full title is the R9 270X DirectCU II TOP, and it's worth every syllable.

The R9 270X is a performance card launched by AMD late in 2013. Since then, the prices have dropped significantly, and the manufacturers have tinkered with its abilities to hone it into a finely tuned piece of technology.

It's based on the Curacao XT variant GPU, with a core clock speed of 1050MHz and a GPU boost clock speed of a rather impressive 1120MHz, which is about 7% faster than the standard R9 270X. Furthermore, the 2GB of GDDR5 memory is clocked at 1400MHz with a memory bandwidth of 179GB/s.

It has 1280 shading units (which AMD refers to as stream processors), 180 texture mapping units and a TDP of 180W. It's a full-sized, dual-slot card, drawing additional power from the pair of six-pin connectors. For this, you get glorious 2560 x 1600 resolutions from two DVI ports, HDMI and DisplayPort.

The obligatory 3DMark GPU score put this particular model at 8670, which is a smidgen over the GTX 760. This, of course, means that gaming is certainly top notch when played through this card, as are the other more mundane duties of normal desktop use. Photo editing was near enough perfect, but rather oddly we did have some



“ Rather oddly, we did have some problems when it came to the video editing ”

problems when it came to the video editing.

The video editing test we ran used OpenShot to create a relatively small three-minute video, with a few transitions and a 3D animated title. It's nothing

too intense but as much as an average user may get up to. For this, the other cards performed reasonably well, with the lower-powered cards taking a little longer to export the output and put it all together. The GTX 760



managed this in a relative blink of an eye, but the R9 270X seemed to stagger through the entire test.

Playing HD video, though, wasn't an problem, so perhaps there's something untoward with the drivers, since the hardware itself should be more than up to the task. Another issue was again the noise levels. While idle or performing normal desktop duties, the card was virtually silent. And when we first ran a game it remained that way for about five minutes, until it suddenly decided to increase the noise levels.

As with the GTX 760, though, it wasn't deafening, but it was a fair amount of noise, which required us to increase the volume on the speakers. As far as we could tell, though, the entire card was cool enough even when being benchmarked and gaming.

If you can take the noise levels and you want to play games, then Asus R9 270X is an excellent card. As far as the price goes, you can pick one up for around £145, which is a fair amount cheaper than the rival GTX 760. The video editing issues are worth looking more into, however, if you're planning on using the PC for that purpose. In that case, perhaps the GTX 760 is worth the extra expenditure.





Asus R7 240

The Asus R7 240 may not have been the most powerful card on test this week, but it performed extremely well in our test system. Plus it's more affordable than the higher-end cards while still being able to deliver a decent level of all-round performance.



MSI GT 730

The MSI GT 730 is another good all-rounder, in terms of performance and price. We also liked the compact design and its ability to squeeze into a mini-ITX case.

How We Tested

Each card was fitted in to a PC with the following specs: Core i7-4790K quad-core 4GHz CPU, Gigabyte Z97M-DS3H motherboard, Samsung 120GB EVO SSD, 16GB Kingston HyperX Fury Red RAM, 750W PSU and an Aerocool Dead Silence Cube.

For testing we used OpenShot with a three-minute video, complete with transitions and a 3D animated intro. Basic desktop (Word, Excel) stuff, Gimp for image editing. And for gaming, *Assassin's Creed: Black Flag*, *Elite: Dangerous*, *Borderlands: The Pre-Sequel* and *Dying Light*.

	Gigabyte GT 610	Asus HD 5450	MSI GT 730	Asus R7 240	Asus GTX 760	Asus R9 270X
Price	£34.50	£36.36	£55	£59.99	£194	£145.90
Slot width	Single, low profile	Single, low profile	Dual slot	Single slot, low profile	Dual slot, compact design	Dual slot
Dimensions	22 x 158 x 121mm	22 x 178 x 120mm	152 x 106 x 38mm	22 x 159 x 111mm	40 x 170 x 121mm	38 x 272 x 133mm
Shading Units	48	80	384	320	1152	1280
TMUs	8	8	16	20	96	180
TDP	29w	19w	49w	30W	170W	180W
GPU Clock	810MHz	650MHz	700MHz	730MHz	1006MHz/ 1071MHz boost	1050MHz/ 1120MHz boost
Memory Clock	1.3GHz	450MHz	1800MHz	900MHz	1502MHz	1400MHz
3DMark Score	560	330	1550	2400	8640	8670
Outputs	HDMI, DVI, VGA	HDMI, DVI, VGA	HDMI, DVI, VGA	HDMI, DVI, VGA	HDMI, 2x DVI, DisplayPort	HDMI, 2x DVI, DisplayPort

Tech Origins

Quantum Computing

David Briddock reveals how we eventually harnessed the weird world of quantum physics

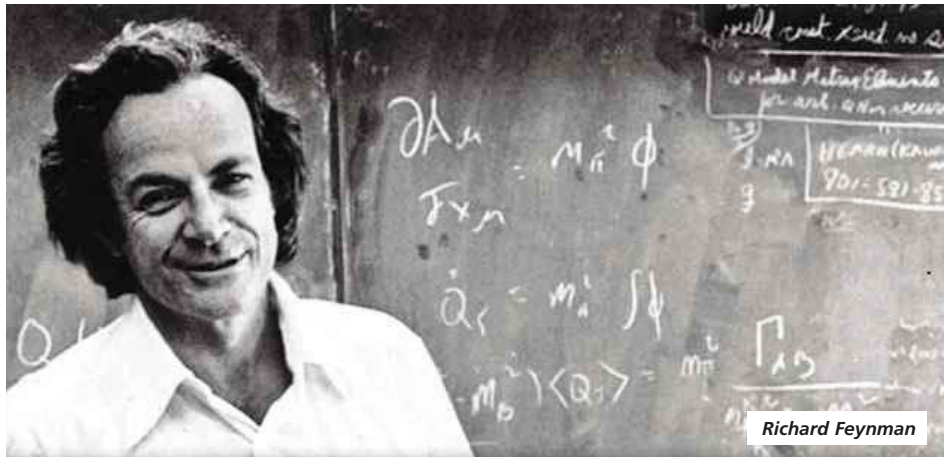
A quantum computer operates with something called a quantum bit (qubit). This acts like a digital bit in our everyday computers, which store binary value of 1 or 0. However, because of the weird nature of quantum physics, a qubit can be both 1 and 0 at the same time. So, in theory, any reasonably sized quantum machine will compute at phenomenal speeds and could potentially break today's unbreakable cryptography codes almost instantaneously.

Theoretical Research

Way back in 1973, Alexander Holevo published a paper that showed how qubits could be a direct replacement for classical computer bits – and when Polish mathematical physicist Roman Stanislaw Ingarden's paper *Quantum Information Theory* appeared in 1976, that caused quite a stir too. It was Richard Feynman – a theoretical physicist and veteran of the Manhattan Project – who really ignited the quantum computing fire, however. During a 1981 talk at MIT he described a quantum simulator, which amounted to a basic model for building a computer that utilised quantum mechanics as its computation engine. Yet, at this point in history, this was little more than an intriguing thought experiment. It would not take on any wider significance until Peter Shor, a Professor of Applied Mathematics at MIT, defined a quantum algorithm for finding prime factors of large numbers, and then a few years later David Deutsch (working out of Oxford University) published a paper describing how a quantum computer could model any physical process by using 'quantum logic gates'.

Real Devices

The first programmable quantum computers didn't actually appear until around 1998, however – and, with just two qubits, even then they were only able to perform trivial calculations. Withing a



Richard Feynman

couple of years, though, advances led on to four and eight qubit machines. These were able to run a number of quantum algorithms, for example obtaining the factor of fifteen via Shor's algorithm.

In 2005 a semiconductor chip appeared operating as an ion trap, a significant step towards scalable quantum computers. A few years later Yale University created the first solid-state quantum processor. It used one billion aluminium atoms that had two different energy states, which acted like a single qubit.

D-Wave

D-Wave Systems release their first commercial quantum annealer based machine, the D-Wave One, in 2011. With a claimed 128-qubit processing capability it marked a huge step forward in practical quantum computing technology. The US military, NSA and Google were among the first to acquire D-Wave hardware.

Housed in a 10 foot high black box, the quantum heart is cooled to -273.14°C (almost 0 Kelvin) by liquid nitrogen and other advanced cooling technologies. In addition a magnetic shielding removes 98% of the field strength we normally experience here on Earth.

Google setup a quantum artificial intelligence lab in 2013 inviting researchers



to use its facilities and discover how to leverage D-Wave's immense potential to enhance the study of machine learning. Hosted by NASA's Ames Research Centre these researchers could play with the second generation 512-qubit D-Wave computer. As D-Wave hardware installations increased the quantum computing focus almost inevitably shifted to software. The 1QBit Company, founded in Vancouver, is a commercially-driven organisation set up exclusively to focus on software algorithm development for quantum computers, with a particular focus on financial applications. [mm](#)

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USING CHROME REMOTE DESKTOP

Last year, Google matched Microsoft by launching a free remote desktop app, but at the time it was only for Android and Chrome-based devices. Now it has an iOS app too, so **John Moore** thought it might be a good time to take another look

A remote desktop option is a handy thing to have. The chance to gain access to – or control of – another PC over a home network or the internet doesn't only allow you access to vital files and software you may need at short notice (which, even in these days of cloud storage and mobile computing, we all know still happens from time to time), it's great for helping out people who may

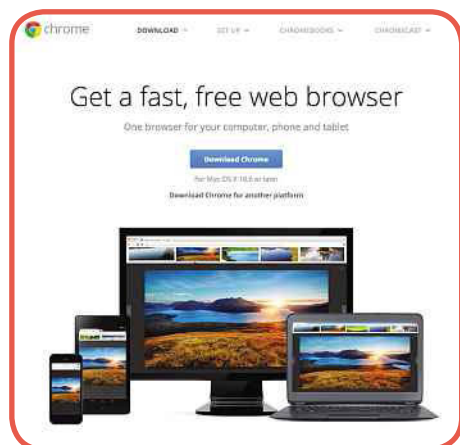
not be quite as tech-savvy as you are. The chance to see another user's screen affords insight into what someone is actually doing with their PC (not always the same as what they tell you they are doing), as well as allowing you to take over and show them the right steps they should be taking. Allied to this, of course, is the chance to explore their settings and see any problems first hand, rather than through the filter of their understanding.

It's far from a new concept, but Google is relatively new to the game. Its Chrome Remote Desktop application emerged in April last year, presumably in response to Microsoft's Remote Desktop app for Android, which had started to gain more traction after the erstwhile go-to solution LogMeIn began to withdraw its free service in January 2014. Not only did Chrome Remote Desktop bring handy Windows-controlling features to Chromebook and Android devices, it also allows users to overview and control actions on OS X machines too, a feature that Microsoft's app doesn't and now that it's added an iOS app to its armoury, it allows you to take control from your iPod Touch, iPhone or iPad too.

Here, we'll walk you through the process for iOS and Android Apps, on both Windows and Mac OS X – because we're nice like that.

Setting Up Remote Desktop

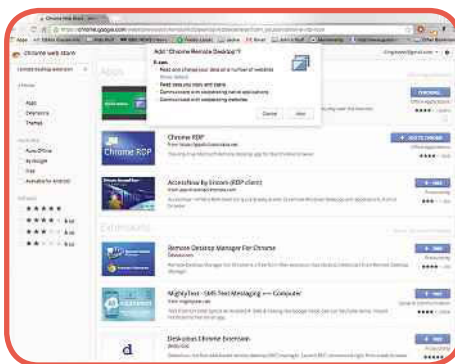
On the machine you want to control or potentially control from, whether you're using a Windows machine, a Mac or Linux, you're going to need Chrome for this to work. First of all, then, go get that from www.google.com/chrome/browser/desktop for your desktop/laptop. Here we're working on a Mac, but as everything in terms of configuration is done from within Chrome, the process is exactly the same on whatever OS you're working on.



Once that's installed, open Chrome and select Apps. On my Chrome browser, it's at the top left on the Bookmarks bar. Then select Web Store.



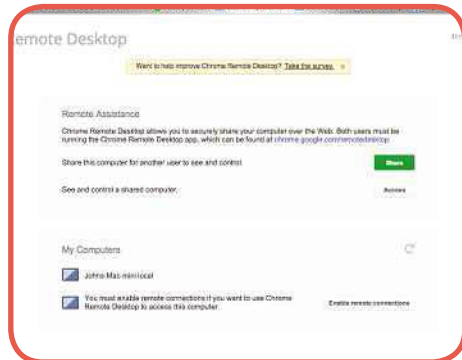
Search in the Web Store for Chrome Remote Desktop; once you find it, click the install button, peruse the permissions it requires, and proceed if you're happy.



Step through the process of granting the application access to your machine and telling it what exactly you want to use Remote Desktop for. If you're looking to grant temporary access to someone else or gain access to another machine temporarily (i.e. to offer or receive technical support), hit the top option. Alternatively, if you want to allow yourself access to your own machine, then hit the bottom option.



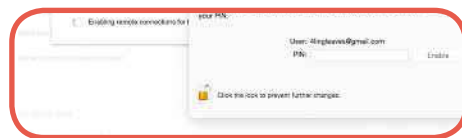
If support's your thing, you then have two further options. Hit Share and you'll be provided a temporary 12-digit code, which your helper will need to enter at their end for the connection to be established. Hit Access and you'll be asked to enter a 12-digit code that someone else is providing to you. Either is a one-shot deal, so if you or they ever need access again, you'll require new codes.



However, if you're looking for access to your own machine from another device, you'll need to enter a PIN to confirm permissions when the time comes. This will be required every time you want to access your machine from another device, so try to make it memorable – you're going to need it.

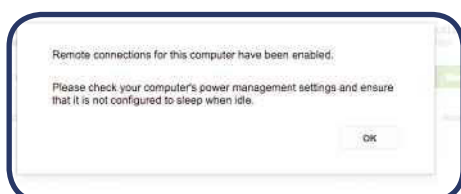
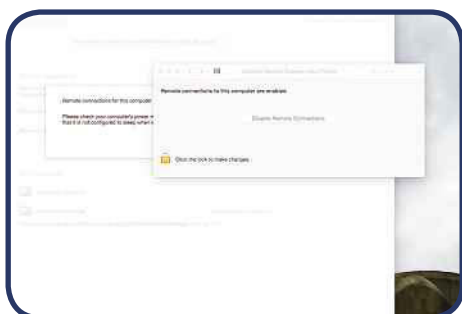


You'll probably need to jump through some OS specific permissions hoops; here are Mac OS X's:



You'll also need to tweak some power management settings to make sure your machine's on when you come to need it.

... And, we're done. Once your machine is on the list at the bottom, you're ready to turn your attention to the device you want to access it from. If that's another computer, then repeat this process again on the other machine. By signing into your Chrome account and installing Remote Desktop there, your machine should then automatically become available to you – simply enter the PIN you specified earlier, and you're free to control it from within the browser.



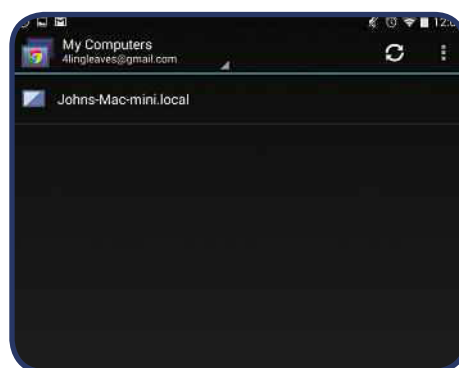
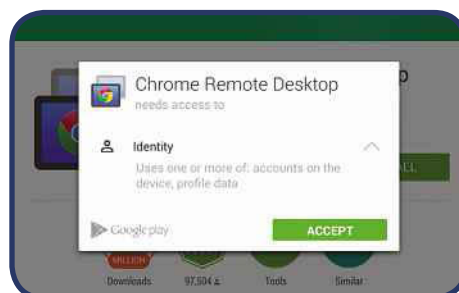
Now your machine is ready to be controlled, let's have a look at the mobile apps that could potentially control it...

Android

To install the necessary app in Android, visit the Play store and search Google Remote Desktop, download the 4MB app and install it

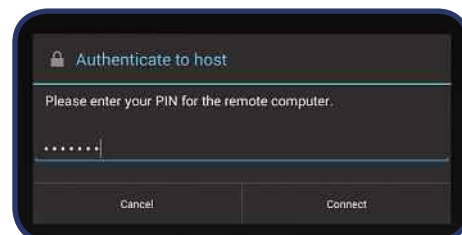
There are more things to agree to. I mean, you *could* disagree, but then you may as well not bother reading any more.

When you are installed and have fired up the app, you'll get a simple black screen. It's basically a list of any machines you've attached to your account using

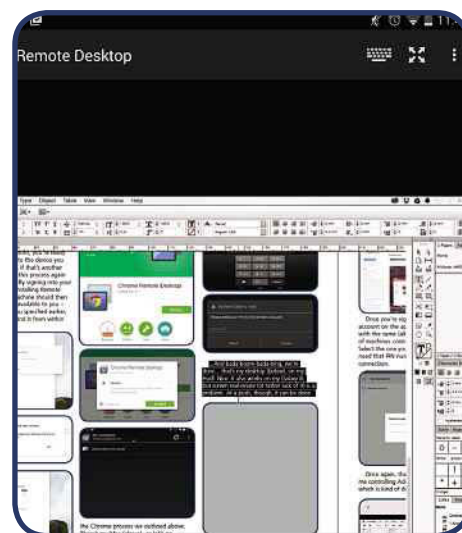


the Chrome process we outlined above. There's my Mac (above), so let's go...

The Authentication process needs the memorable PIN number you defined as part of the registration when you were setting up the target machine. So type that sucker in...



...And bada-boom-bada-bing, we're done... that's my desktop (below), on my Hudl. Nice. It also works on my Galaxy III, but screen real-estate (or rather lack of it) is a problem. At a push, though, it can be done.

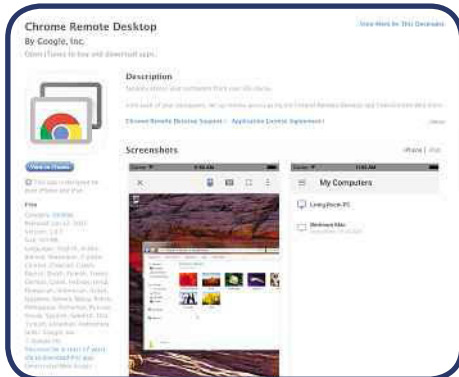


iOS

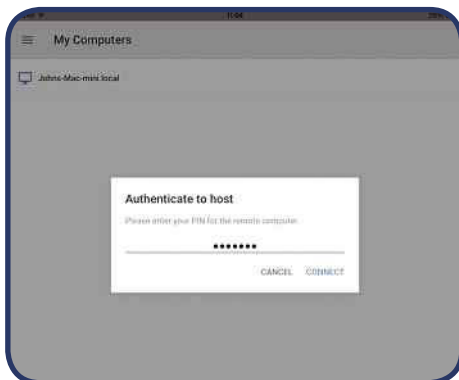
Apple's version is available on iPhone and iPad, but we used the latter. Head to the App store, search, download and install.

No Love For Windows RT?

Sorry guys, forget it. Windows RT still doesn't allow the installation of Chrome, so therefore there's no way to get Remote Desktop to work unless you have a full-blown Surface Pro and/or full-blown Windows 8 installation. Of course, Windows has its own Remote Desktop application if you need to get control of a Windows machine using a Surface (and if that's what you need, in all honesty, for the vast majority of people there's little reason to look elsewhere), but if you need to get access to a Mac OS X or Linux device, you're going to need to turn to a third-party VNC-supporting app like Mocha VNC, which you can find in the Windows Store (tinyurl.com/lucjdcdr)



Once you're signed into your Google account on the app, you're then presented with the same (albeit prettier, I'd assert) list of machines connected to your account. Select the one you want – and then you'll need that PIN number again to confirm connection.



Once again, that's it... There you can see me controlling Adobe Indesign via an iPad, which is kind of doable if you're patient.



Why Does Google Care About Remote Desktop?

While it was largely considered a niche service in its own right in the past, Google and Microsoft are both using Remote Desktop as part of a bigger portfolio sell for their respective platforms. There is undoubtedly a 'me too' element to Remote Desktop. Google seemed happy enough to let the status quo in that market persist, until LogMeIn made the business decision to remove its free service, and Microsoft stuck its oar in by bringing its own app to Android (Remote Desktop had long been a Windows feature, but it's the move to the Google-led mobile OS that seems to have stimulated the response). It only took a few months for the reply to appear, and now Google has obviously made the decision to go beyond the capabilities of Microsoft's offering and branch over to iOS too. It's probably done this simply because, as the system is all based on Chrome, it's not too massive a leap.

While Remote Desktop's functionality undoubtedly added something to the ever growing legion of Chromebooks that are available these days (indeed, a feature that could significantly expand their usefulness to some users), it is also a good selling point for the Chrome browser itself (which is, of course, required for it to work whatever platform it resides on). This new app, then, offers Google the chance to get another finger in the iOS pie and potentially attract iDevice users to its eco-system, rather than Apple's. Small steps, small steps...

You will, however, miss the modifier keys, which are not part of the native iPad keyboard. Across the top, as with the Android app, you have options to summon the keyboard, go full screen and there's also a drop-down set of three options: send Ctrl-Alt-Delete, Disconnect, Help & Feedback. Obviously, the middle one isn't much use to a Mac.

The iPad App also offers an alternative mouse mode, that allows you to treat the target machine much more like it's a touchscreen native device, rather than dragging the mouse pointer around, as is the only option on Android. What you use, I suspect, will be down to taste, though.

What's It Like Then?

As befits Google, the whole process is about as simple as it could be. For those confident in the security of their devices, there's even the option to bypass entering a pin number when you log on again. We wouldn't recommend this, if we're honest; the damage that could be done very quickly should someone malicious manage to get into your machine doesn't really bear thinking about.

The controls take time to get used to when using a touchscreen. Sadly, we're informed that it doesn't play nicely with Bluetooth mice. A keyboard (with the requisite function modifier keys), though, would be a definite boon, as these are sadly missing from both the iOS and Android offerings. However, the multi-touch gestures worked very well (a two-finger tap, for example, is equivalent to a right mouse-click) and, as a when-all-else-fails option, a mobile or tablet will give you access to your machine when you need it. The reality, though, is that to get any real work done, accessing through a machine with a mouse and keyboard (laptop, Chromebook or another PC) is the only real option.

That is an entirely plausible idea, by the way. Personally, I have managed to work and operate software to great effect using Remote Desktop. It's not seamless, but it won't drive you absolutely crazy. It certainly makes the idea of buying a Chromebook a whole lot more attractive to me. Knowing that, provided I can establish a stable internet connection, I could access my Mac from anywhere is an extremely attractive prospect – certainly more attractive than, say, kitting myself out with a laptop powerful enough to run all the software I may need. For free, I can definitely live with this. **mm**



APP INVENTOR 2

David Briddock examines a simple yet powerful Android app creation tool

Over the last few years, there's been a dramatic rise in Android smartphone and tablet sales. Wide choice of styles and size formats plus competitive pricing has helped. And despite a slow start, the Google Play store now offers a similar number of apps to Apple's App Store.

This widespread availability has also encouraged some owners to design and build their own apps, either as a personal challenge or as a money-spinning idea. But unfortunately, just as with iOS, the Android platform's professional development languages and tools are difficult to learn and tricky to use.

Nevertheless, there have been some encouraging projects to try to put Android app building within reach of anyone with an interest in app construction. And now, following

extensive consumer feedback, some have been redesigned and improved.

Let's take a look at one of the most promising and approachable solutions around today: App Inventor.

Background

Google launched App Inventor version 1 in December 2010. At the time, it was an innovative and interesting attempt to open up Android app development to those who didn't know or didn't really want to learn a traditional coding language.

One of its key attractions was that apps could be constructed from interlocking blocks – an approach that removed the need for a traditional coding language. It's a strategy that's also been adopted by the Scratch development environment, which has become a firm favourite with the Raspberry Pi community.

Nevertheless, this initial version had a number of frustrating shortcomings, which rather dampened the initial enthusiasm of budding app designers.

However, in 2011 Google handed over the code and product responsibility to a team from the Massachusetts Institute of Technology (MIT) Center for Mobile Learning, led by App Inventor creator Hal Abelson and fellow MIT professors Eric Klopfer and Mitchel Resnick.

Aware of the shortcomings in what is now known as the 'Classic' version, the MIT team beavered away to create a major upgrade, which they subsequently named App Inventor 2 (AI2).

It's just a simple to use, yet is a more powerful solution to building bespoke apps for Android smartphones and tablets.

AI2 Component Categories

- User Interface
- Layout
- Media
- Drawing & Animation
- Sensors
- Social
- Storage
- Connectivity
- Lego Mindstorms



The key to the rich potential of App Inventor 2 is buried in the two main construction views, namely Designer Mode and Blocks Mode.

Designer Mode

As you'd expect, the designer mode screen is the place to select, arrange and configure the main app elements. There are five main areas of the screen:

- **Palette:** a collection of visual and non-visual components grouped by category,
- **Viewer:** a visual representation of the user interface.
- **Components:** a hierarchical list of added components.
- **Media:** a list of media resources.
- **Properties:** editable characteristics of the currently selected component.

In AppInventor 2, the palette components collection is much more comprehensive than in the previous version. As you'd expect, many are user interface specific, such as labels, text boxes, spinners, lists, images and so on. Yet there's plenty of fun to be had by investigating the full gamut of categories.

There are media blocks, which supplement video handling with speech recognition and text-to-speech; animation blocks to control images on a custom canvas; sensor blocks to access the internal clock, accelerometer, GPS orientation and barcode scanning; and there's connectivity via the web, Bluetooth and, depending on your device, near field communication (NFC).

There's even a Lego Mindstorms section which contains blocks to interact with the NXT unit. They can issue commands, drive the motors and even collect light, colour, sound, touch or ultrasonic sensor data.

To take maximum advantage of the designer mode, it's best to have a fully formed plan, either in your head or sketched out on paper. This plan would specify the app's main purpose, the desired app behaviour and finally



▲ Android Emulator

So what does App Inventor 2 actually offer the Android app developer?

Just A Web Browser

The most important change for novice app developers is that all you need is a web browser (Google Chrome, Mozilla Firefox or Apple's Safari) to create the visual design elements and assign app behaviour.

This means there's nothing to download, nothing to install and nothing to configure to begin your Android app building adventure. It also ensures Windows, Mac and Linux users can all join in the fun.

Only when it comes round to testing out your app on an Android smartphone or tablet (or via an emulated device if you don't have a real one to hand) will you need a small download, as we'll see later.

Diving In

Getting started with App Inventor 2 is easy. Just visit ai2.appinventor.mit.edu, then sign in with your Google account. Don't worry if you don't already have a Google account. It's a quick and free process to sign up for a new one.

Once signed in, the App Inventor 2 interface will appear. As can be seen in Fig. 1 (AI2 Web Interface), this is a busy-looking web page crammed full of functionality.

The good news is no matter what sort of app you wish to create, the basic construction process is always the same:

- 1) Set screen name & properties.
- 2) Add app interface components.
- 3) Add any media files.
- 4) Create more screens.
- 5) Define app behaviour with blocks

the sort of App Inventor 2 components needed to bring the app to life.

Blocks Mode

After the design phase, it's time to set your app's behaviour. Normally this is done using a coding language, but with the inventor it's all done by snapping together coloured blocks and entering specific bits of numeric or textual data.

This might appear to be a rather limiting strategy, but in this second incarnation of the App Inventor there's an extensive and highly functional collection of blocks to choose from. These blocks cover all the essential coding elements including statements, procedures, variables, operators, objects, properties, methods and comments.

The block menu is arranged into colour-coded sets: brown for control, green for logic, purple for math, cyan for lists and so on. And the colours aren't there just to make the code to look visually attractive. In fact, they help to quickly guide the eye towards the areas of interest, for novice and experts alike.

Appropriate blocks are connected to the screen components, added during the design phase. In this way, a field can be dynamically filled with downloaded information, a button click can initiate a custom operation and sensor data can be extracted at periodic intervals.

App Projects

In App Inventor 2, the projects are stored in AIA files, rather than the previous zip containers. There's a large and growing collection of these AIA project files available online.

What kind of apps can you create? Well, the possibilities are endless. Here are just a few ideas:

- A smart messaging app that reads some text input and then communicates it as a text message, tweet and email with a single button click. This app could use the ContactPicker, PhoneNumberPicker and Twitter components from the Social palette.
- A location tracker app that includes the Sensor palette's LocationSensor block, which in turn uses the information from the GPS chip (if available) and local wi-fi network identities.

- A todo list app that stores the entries in the cloud using the TinyWebDB component from the Storage palette.
- A personal lottery number app that creates a randomly generated set of numbers every time your device is shaken, via the Shaking method found in the Sensor palette's AccelerometerSensor component.
- A game app that uses the pitch and roll values in the Sensor palette's OrientationSensor block to control the movement of an animated image based on one or more sprite animation blocks.

App Testing

Once your creation is finished, you'll need to test it. And there are two approaches. One is by establishing a connection to a real Android device. The alternative is to install a virtual device app.

To establish a connection to a real Android device you'll need to download and install the MIT AI2 companion app from the Google Play store. Both the Android device and the computer must be connected to the same wi-fi network.

When it starts up, the companion app requests a six-character 'handshake' code, which needs to be entered into App Inventor 2 using the Connect menu's AI Companion option.

The virtual device simulation scenario allows apps to be tested without a real Android device. However, a simulation won't be able to do everything a real device does, so things like wireless communication, GPS location, movement and sensor inputs are best tested using a real Android smartphone or tablet.

First, you'll need to download and install the 'aiStarter' software (see instructions on the App Inventor 2 website). When started, the emulator displays a generic-style Android device interface, plus a number of predefined buttons, which emulate specific taps, swipes and other gestures.

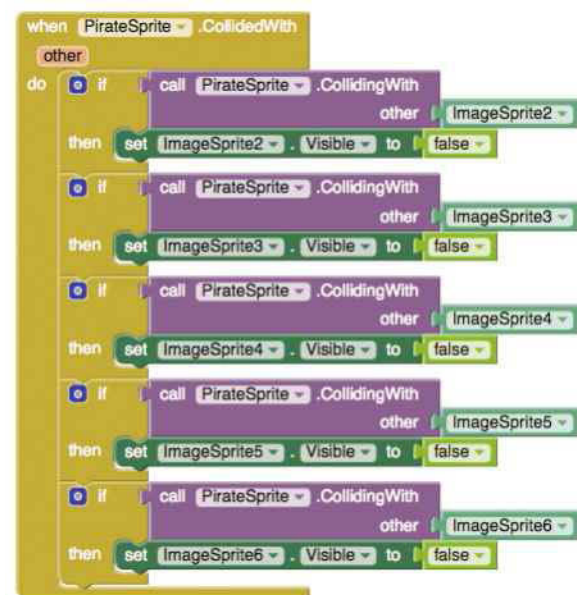
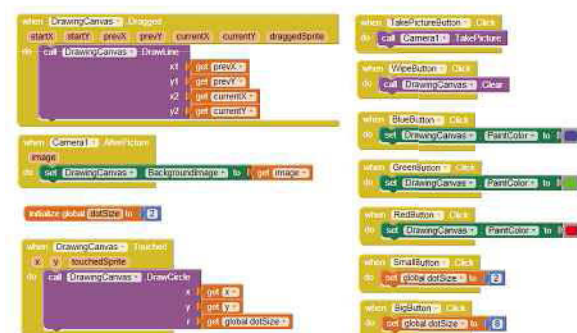
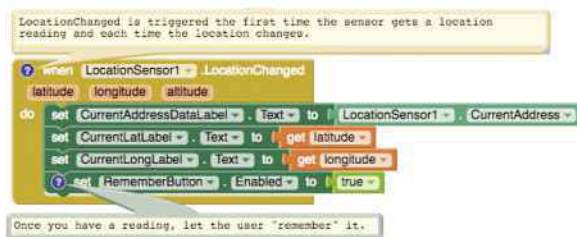
App Distribution

After a few adjustments to the code blocks or data, you should now have a fully operational app. The next step is to create an Android package file.

Why? Well, this package file can be installed on one of your Android devices or on a friend's Android device or uploaded to the Google Play store.

AI2 Block Categories

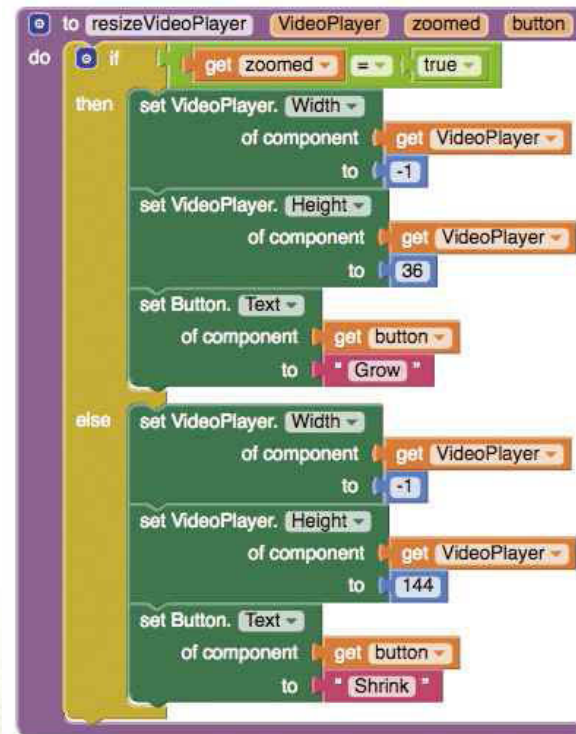
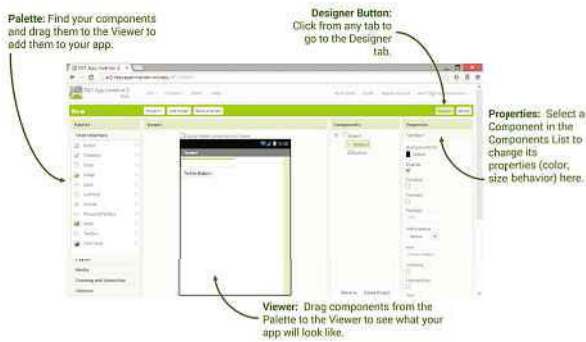
- Control (if, then, while ...)
- Logic (and or, not ...)
- Math (random, round ...)
- Text (" ", length, trim ...)
- Lists (create, append ...)
- Colours (basic, RGB ...)
- Variables (get, set ...)
- Procedures (to, call ...)



▲▲▲ Location sensor code blocks
▲▲ Paint pot app code blocks
▲ Sprite animation code blocks

With App Inventor 2, building a self-contained Android package (known as an APK file) is a simple process, which stores the package file on your computer.

Once created, an APK package file can be 'side loaded' onto an Android device via a USB connection. To do this,



^^ User interface designer
 ^ Video player code blocks

go to the Android Settings app, then turn on USB storage and also ensure the 'installation of apps from unknown sources' setting is active. Tap on the associated package icon, and a short while later your app is ready to run.

Example Apps

A good way to begin is by downloading an online project. There's a wide range of topics to choose from such as fun games, science simulations, math calculators and much more. You could choose a project that's similar in nature to your own app idea or just whatever sounds interesting.

At appinventor.org, there's a large collection of learning and teaching and resources for the App Inventor platform, but it also has a useful collection of over 20 Android app examples.

Each example app is broken down into a number of construction steps,

each with its own description and often a short video tutorial too. Associated downloads include PDF format app documentation, the AIA project file and even the complete APK Android app package file.

Downloaded AIA projects can be added to App Inventor 2 via the Import Project menu option, while APK app packages themselves can be 'side loaded' onto an Android device using a USB connection.

Sharing With The World

If you've created something special and would like to share your app with more than just family and friends, then you can. The generated APK Android package file can be placed on the Google Play store as a free app. Once done every Android device owner will be able to find, download and install your app.

As there are hundreds of millions of Android devices in circulation, you might become quite famous. All you need is an original idea, a clever and memorable app name and enough time spent playing with App Inventor 2 to create a polished, bug-free piece of software.

Selling Your App

Making money from your app creation is an appealing concept. Although app prices on Google Play store are low, typically 50p or £1, with so many Android devices around, the money can quickly mount up.

Yet it's not quite that simple. Any new app has to compete for attention

with hundreds of thousands of existing apps. So to make money you'll have to provide something that's different to every other app or something better than the competition.

That's quite a challenge. But many have done it in the past. Home-based app creations have given some people a useful second income. Others have been able to give up their previous employment and just concentrate on apps, while a select few have become very rich indeed.

However, there are quite a few steps involved in submitting an app, especially a financially successful one, so here's a quick summary of the tasks to perform.

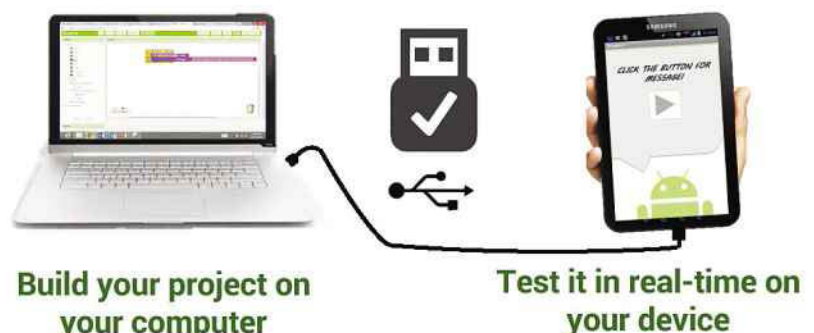
First of all, you'll need sign up for a Google Play account and then pay a one-off \$25 publishing registration fee.

Next, you'll need to decide on the app's price, which will be from \$0.99 upwards.

Then there's the app asset information. This includes the APK package file (max 50MB), at least two app screenshots, a high-resolution app icon image (512x512 32-bit PNG), a promotional graphic (180x120 24-bit PNG), a feature section graphic (1024x500 24-bit PNG) and ideally a YouTube video link.

And finally there's the general app information: app title (unique and memorable), app description, language (if not US English), genre (app or game), category type and contact information.

Whatever you come with, happy inventing and good luck! **mm**



App Inventor 2 Links

MIT AI2 website: ai2.appinventor.mit.edu

MIT AI2 installation and setup:

ai2.appinventor.mit.edu/explore/ai2/setup.html

MIT AI2 tutorial videos:

ai2.appinventor.mit.edu/explore/ai2/beginner-videos.html

AI2 community resources: appinventor.org/applnventor2



Vapour Rub



Mark Pickavance looks at a collection of products that seemingly can't make the transition from glitzy promo launch to purchasable product

Work for any time in the tech industry and you might easily come to the conclusion that it's an odd blend of reality and fantasy.

Companies often commit to product launches without an actual product to sell or even a completed design. This can often lead to a curious discord where the practicalities of delivering on a marketing presentation are entirely out of sync.

Depending how wrong things go, this can be just a timing issue, where a product takes longer to deliver than was anticipated. Or it can be that the concept is horribly flawed, impractical or the market just isn't ready for it.

What's generally fascinating about these rogue projects is that while businesses are happy to put millions into announcing a new product launch, they won't pay pennies to tell you the same product is delayed or even cancelled.

Luckily, Micro Mart is on hand to remind those companies of the promises they made and how they've so far failed to deliver on them.

Steam Machine And Controller

Valve first talked about making specific hardware for playing Steam a good number of years ago, and it's even created a prototype Linux distro, SteamOS, which you can download to create your own based on stock PC hardware.

But what many people are waiting for is the official Steam Machine that will effectively bring this platform into direct competition with the Xbox One and PS4.

The official Valve announcement was given in September 2013, and it sent out 300 prototype Steam Boxes to beta testers in December, with another 2,000 units being dispatched in January 2014.

With this momentum, the actual retail version was due in mid-



2014, but that date came and went. In May, wishing to tone down expectations, a posting on the official blog revealed that 2014 wasn't going to be the year this product launched.

The culprit was apparently the official controller: "We're now using wireless prototype controllers to conduct live playtests, with everyone from industry professionals to die-hard gamers to casual gamers. It's generating a ton of useful feedback, and it means we'll be able to make the controller a lot better. Of course, it's also keeping us pretty busy making all those improvements. Realistically, we're now looking at a release window of 2015, not 2014."

“ Valve first talked about making specific hardware for playing Steam a good number of years ago ”

Since then, there has been no further blog announcements on that subject, although Steam did a major update to SteamOS in January.

At this time, there is no more specific a date for release than 2015, and Steam didn't appear at the recent Consumer Electronics Show. According to a few sources, Valve will have a big presence at the GDC Expo (Game Developers Conference), held each March in San Francisco.

A failure there to provide concrete delivery dates for the official Steam system will probably convince many that this project has been vapourware from the outset, although SteamOS is undoubtedly real.

Here's hoping this one actually condenses soon, because Valve had a very solid reputation before the flexible timescales of this flagship project.

Geonaute 360 Camera

The 360 camera by Geonaute is a new twist on the selfie, where the cylindrical pod can take a 360° view of any scene using three wide-angle lenses and their associated 8MP cameras.

The prototype was first shown in 2012, and then a supposedly finished product was presented at CES 2014. It won an Innovations Design and Engineering award at that show. At that time, you could reserve one for \$499 (£350) on its website, and you can still commit to get one at that price today, over a year later.

What's somewhat disconcerting is the Geonaute company blog, where we're told that the Geonaute 360 team is full speed ahead!

Or rather, they were on 9th January 2014, and 'in the final stages just before full production.'

The longer this final stage goes on, the less likely it appears that the Geonaute 360 camera will actually make it out of the development shadow into the light.

Razer Project Christine

For those who like gaming devices, Razer has a good reputation for making some of the best. Its mice are especially desirable, but it makes other PC-related products, many of which it first announces at CES. One of these was something called Project Christine, the latest in a long list of attempts to modularise the PC that this writer has seen.

Originally promoted at CES 2014, many enthusiasts have waited for Razer to sell its revolutionary modular PC. With a working prototype to show journalists and an elegant design, it was surely only a matter of months before the world of desktop computing was turned on its head? At least that's what many thought at the time. Alas, a full year later, Project Christine seems no further along than when it was one of the talking points of CES.

Much of the problem, it appears, is convincing OEMs, those that make motherboards and video cards, to buy into the idea. Without their support, there is little point in being modular, if there aren't any alternative modules.

In March 2014, Razer CEO Min Liang Tan did a series of interviews to explain why the product hadn't launched and to reassure those interested that Project Christine wasn't imaginary.

Talking to Maximum PC, he said, "Like the many other projects





▲ Leaked images of *Doom 4* models have appeared online, but no game

within Razer, we take a long-term view of innovation, and Project Christine is definitely still in the works.”

Since then, the subject hasn’t been brought up, leading to the inevitable conclusion that the concept was just too revolutionary for those that sell computing parts. They’re more interested in proven profitability of products rather than technical elegance, unfortunately.

Although not officially dead, the possibility that Project Christine will deliver on its promotional material now seems a long shot at best.

Doom 4

Who doesn’t like *Doom*, really? It was the game that unlocked the FPS Pandora’s box that spawned *Call of Duty* and a billion other titles.

However, as game franchises go, this one has hardly been oversubscribed with releases. The last *Doom* came out in 2005. It is in fact so old that the engine it uses was released under GNU General Public License four years ago.

With such a popular franchise, *Doom 4* wasn’t a surprising choice when Id Software first vaunted the idea in 2007. Apparently to be set on Earth invaded by demonic creatures, the new game wouldn’t be a sequel or a reboot, but would connect to the other games somehow.

The vagueness of some of the statements associated with *Doom 4* goes some way to explain why eight years later this title still doesn’t have a playable demo, official screenshots or a release date.

To complicate matters, Id Software was bought by ZeniMax Media (aka Bethesda Softworks) in 2009, and reputedly at some point after that the entire project was shut down and then restarted in 2011. Two years after that, John Carmack, lead developer at Id Software left to work on Oculus Rift, leaving the *Doom 4* team in what many have described as development hell.

The last official news about *Doom 4* came in July 2014, when it was revealed that Tiago Sousa, lead R&D graphics engineer at Crytek (*Far Cry*) was convinced to join Id Software and work on the rendering side of the game.

If this and other appointments don’t turn this project around soon, *Doom 4* might ultimately out-vapour *Duke Nukem Forever*, which went on a horrific 15 years before a mostly negative conclusion.

Google Glass

Some people will wonder why I’ve included Google Glass in this list, when we’ve all seen people on TV wearing them. And for those who had £1,000 spare, the development version has been available for some time.

But while the prototype hardware has been sold since 2013, this was never intended to be the commercial version of the product or anything near.

Termed the ‘Explorer edition’ by Google, these development versions went out to those who like to be at the bleeding edge of technology or wanted to develop software for it – and those who could afford to pay to play.

The trouble is that according to Google, the whole point of Glass was to be used by normal people, not the terminally technical or outrageously affluent.

But at this price and with a 45-minute battery life, those were exactly the people were using it.

The value of this exercise was therefore limited, and when what little value it had eventually sunk in when Google withdrew Glass entirely a few weeks ago.

The noises that Google is now making are entirely contradictory, and could easily be interpreted as suggesting that the experimental phase of Glass is over and it was a failure.

Along with the end of the Explorer edition production and sales, Google announced that the Glass team would be taken

Ryugyong Hotel

It might seem a bit existential to say so, but belief is a substantial part of reality when you live inside North Korea. If the party says something exists it does, and if they say it doesn’t then that might also be true. Even if they previously said it did, confusingly.

The most monumental vapourware project ever must be the enormous Ryugyong Hotel located in Pyongyang, capital city of North Korea.

Originally started in 1989 its well over a thousand feet high, and was designed to have 3,000 rooms when complete. Who would have stayed there is unsure, as North Korea doesn’t exactly encourage tourist, but at this point nobody ever has.

The collapse of the Soviet Union ended the funds used to build it, and despite the physical structure of the building existing it was left to rot.

A decade later the building was assessed for potential renovation and deemed ‘irreparable’ by European building inspectors, who noticed that the elevator shafts were wonky and the concrete used being substandard throughout.

Unperturbed by such disturbing details building work started again in 2008, when the missing exterior of the build was added, and some internal work was done.

There have been numerous dates presented as when the building would officially open, but at this time they’ve all come and gone without great ceremony.

Clearly embarrassed by the 26 years that have passed by since the first work began, government officials have taken to removing the location from city maps and photo shopping out the gargantuan pyramid structure from images of the skyline.

In terms of vapourware, the Ryugyong Hotel is probably one of the biggest and most expensive examples on this planet.

The regimes problem is that even if it is made of poor materials, making a 1,100ft building disappear in reality takes more than a few political edicts.





out of the research directed Google X division to become its own entity within Google.

That suggests the research phase is over and they're shifting to production. However, that's patently not true, and at this time Google doesn't have a date when Glass will return or in what context.

In the meantime, it's worth noting that three of the critical people behind Glass are no longer at Google. Babak Parviz, the technical architect left to become a VP at Amazon last summer, while Adrian Wong, chief of electrical engineering, and Ossama Alami, director of developer relations, also went elsewhere.

Not all the problems that Glass had have been technical or staff related. Along with those public locations that chose to ban Glass wearers, there hasn't been much software to install on the devices and very little new stuff being developed.

If Glass does come back, it's likely to be radically different, and until then, it certainly should be labelled 'vapourware', as it appears no nearer to commercial release. Google insists the project isn't dead, but that doesn't make it a commercial certainty either. The recent announcement of Microsoft's Holo Lens tech has also sparked significant interest in a different direction for augmented reality.

Microsoft Surface Mini

Before anyone writes to me and complains that a product can't be vapourware if it has never been announced, I accept that. But I also know that this product exists and that Microsoft actually did a production run. Exactly how many it made is pure conjecture, but I suspect it was in excess of 10,000 units.

Why so many? Well, the product was only pulled 48 hours before it was due to be launched, at the same New York launch where Microsoft did announce the Surface Pro 3. In fact, it invited journalists (no, not me, curiously) to the presentation, calling it a 'small Surface event', and then pulled the plug.

It appears now that both CEO Satya Nadella and executive vice president Stephen Elop went cold on the idea of ARM-based Surface devices and stopped the release before they spent any more money on it.

Since then, Microsoft also hasn't made any mention of a successor to the Surface 2, and has even gone as far as to say that the ARM tablets will be getting an upgrade when Windows 10 launches, though not specifically that OS.

The existence of this device had been known for some time, and there are people at who work at Microsoft's HQ in Redmond that have them. They've also fallen into the hands of a few chosen journalists, with the proviso that they never show or talk about them.

There is a possibility that the Mini still might return, perhaps

➤ *The Microsoft Surface Mini: not coming to a shop near you in the near future*





▲ A prototype of the 'McLaren' Lumia flagship phone that Microsoft decided it wouldn't launch

based on Intel Atom technology, allowing it to run Windows 10 in the future. But for now it will mainly be occupying large amounts of warehouse space and making another big write-down in the succession of ones allocated to the Surface product line.

Microsoft Lumia Flagship Phone

If you have a Nokia Lumia and like it, then you might be wondering when the next new flagship design will be coming. As Microsoft owns that phone company now, it decides what new Lumia devices are coming, and it's released a slew of low-price devices in the past few months. So where are the high-end designs that will compete with the iPhone 6 and Samsung Galaxy S5? Well, it seems they're largely imaginary.

At this time, the two high-end Lumias are the 1020 and 1520 models, but they launched in July and October of 2013 respectively. Since then, the only full-price phone Microsoft has announced was the Nokia Lumia 930 (codenamed Martini), and that was in April 2014.

According to Microsoft insiders, there was to be a new flagship design codenamed 'McLaren' that featured a Kinect-based technology allowing for hand gestures. It was meant to be a successor to the 1020 (1030 anyone?), but for a long list of reasons, it is now cancelled when it was originally planned to be on the Christmas 2014 shelves.

Yet Microsoft seems still very committed to its mobile platform, even spending the time to tell everyone at its recent Windows 10 presentation that it's going to be synchronising the experience between PC and mobile.

That said, due to the control the provider networks have over phone updates, a significant portion of the older Lumia devices

aren't using the latest 8.1 release, and the majority of phones on this platform are low-end Lumia devices, like the 520. Those wishing to see an aspirational Windows phone are left dangling, with no indication as to when that's likely.

Apple Watch

The iWatch, as people wrongly assumed it would be called, had been the source of much rumouring around Cupertino long before Apple officially announced the product in September 2014.

By this time, Samsung was already on its second generation wearable technology and had yet to make anything that could be remotely classified as indispensable. The appearance of the Watch changed all that, with wearables in general given a credible slap on the back by association with Apple's interest.

There was some disquiet about the shape and size of the device, but fans of Apple seemed suitably impressed by the Watch's presentation. Since then, though, it has become apparent that much of what Apple presented in respect of the Apple Watch was somewhat concocted to make the appearance of a finished device that it didn't have at that point.

That's not uncommon, as many companies have done that in the past, but it might be coming back to bite Apple, according to a slew of reports that suggest the device has such a poor battery life that it could be seriously compromised.

A pro-Apple website called 9to5Mac published a story that suggested that the Watch wasn't living up to Apple's intended goal of 19 hours mixed use battery life and 2.5 hours active use. Exactly how far short it falls isn't revealed, though selling a watch



that effectively needs to be mains powered might not impress many prospective punters.

What's interesting about these rumours is that it shouldn't really be a surprise if it's true, because all the wearable tech of this variety launched so far has battery life issues. That Apple can't send a legal team to beat up the laws of physics isn't news, although that hasn't stopped many potential customers entering their panic rooms at the news of problems.

“ If you have a Nokia Lumia and like it, then you might be wondering when the next new flagship design will be coming ”

So far, Apple hasn't adjusted its timescales for its 'early 2015' launch, although its website wording has been changed to 'Available 2015' in the past few weeks. That indicates either a production volume snag or the battery life problem is a greater issue.

When it does appear, then people will be able to assess if it's the problem that's vapour or the product. Whatever the truth is, those interested in the Apple Watch might have to adjust their expectations.

Google's Project Ara

When I started writing this feature, Google's Project Ara modular smartphone was definitely vapourware, and then remarkably at the 11th hour it just might not be.

This concept was born out of the acquisition of Motorola by Google and the buying of some related phone patents from a company called Modu in 2011.

The design and development of the devices started in earnest a year later, and images of the first concepts arrived a couple after that.

At the time, much scorn was poured on the modular aspect by other phone makers, which pointed out that to make the phone modular would make it bigger and heavier than a non-modular design.

Undeterred, the Ara team carried on, and a prototype was presented at Google I/O in 2014, though it didn't actually function as a phone at that time.

At that point, many people put it firmly in the vapourware basket, probably some way behind Google Glass in the likelihood that it would ever be released.

Yet just a few weeks ago, the development team presented 'Spiral 2' prototype hardware at a developer's conference and revealed that a 'Market Pilot' (allegedly in Puerto Rico) wasn't far away, and a retail release is planned for this year.

The next stage is for Spiral 3 hardware to arrive, which Google promised would introduce an inductive data connection between modules, a better battery, 4G/LTE and endo wireless communications interfacing some modules.

This all sounds positive, though the final product still seems some way off, with plenty of hurdles to get over before it is proven to be more than marketing magic.

Final Thoughts

At one time, I wrote a feature where all the products I mentioned never existed in anything other than mock-ups or CGI renders.

Therefore my collection here probably represents an improvement of sorts, because most of them actually exist in one form or another, even if they're having a major problem making it into the retail sector.

They also highlight the difficulties in getting a product to market in a timeframe where it is still relevant, due to the unrelenting speed of technical development.

Once a product misses a critical launch target, the sell-by date soon expires, as the parts used to make it are superseded and even the concept can be overtaken by events.

The success of any product is a combination of the creative design and manufacturing work done to produce it, marketing the concept and delivering the whole exercise at the right time. Failure to execute at the right time can condemn a good product at launch or, as with the Surface Mini, scupper it entirely.

Because of that, if a product fails to appear within six or nine months of its original projected release, then the chance that it will never materialise is much greater. Ones that are more than a year late either never appear or fail spectacularly.

For companies building these products, it is probably better not to announce them with a big fanfare before they've ironed out the wrinkles, so they don't later have to explain repeatedly why their exciting new products have failed to arrive on time. [mm](#)





Free Music Apps For Android

Dance around your phone or tablet with **Keir Thomas'** examination of five apps that offer free access to music

Unlike the evil Apple empire, Google doesn't implicitly link tablets and phones to its Google Play music and video services. Sure, you'll find the Google Play music and video apps preinstalled on devices, but you can also use other services if you wish (or just rip your own audio and movies). The choice, really, is yours. This is Android's greatest strength.

Below, we look at five apps that let you listen to music in some fashion – whether that's downloading direct to your device, or streaming, or both. As always the apps were tested on a phone and tablet running Android 4.3 Jelly Bean, and all are free of charge within the Google Play store.

Rather strangely, many apps we encountered were essentially clones of each other, often leading to apps that were identical in look and function. We simply don't know whether these were rip-offs – legal or illegal – but the goal of most was obvious: to serve ads and make money. Finding the 'original' app the others copied was akin to finding the original vampire

in order to end the curse – practically impossible, with many apps simply lying and stating that they are the 'official' version. Ripoffs like this are not pretty but, well, that's the Google Play app store in a nutshell. With freedom comes chaos!

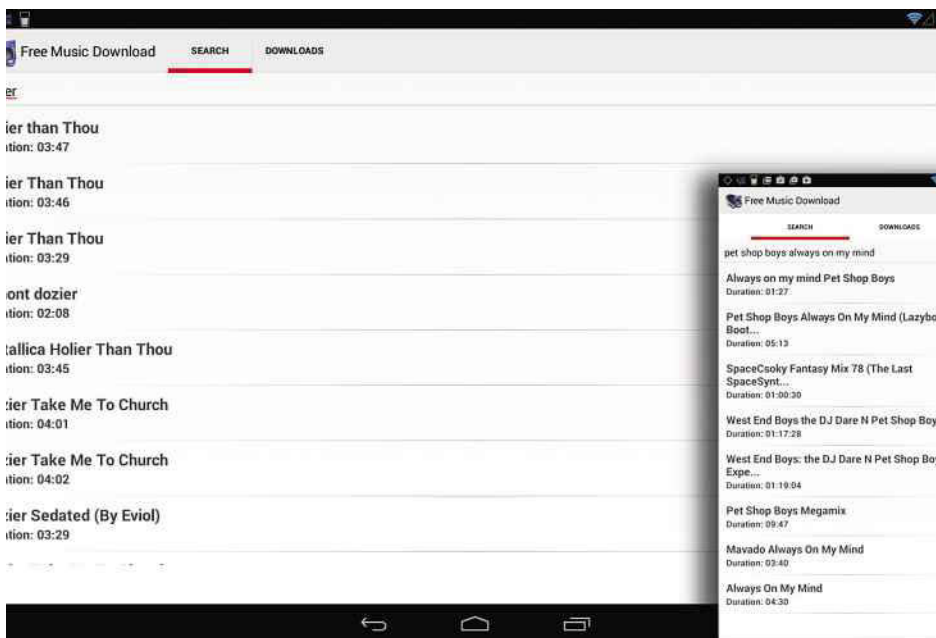
Which also brings up the question of legality: basically, we're testing the functionality of these apps, and whether they do what they claim to do. As you read on you'll note that we are unsure as to where many these apps are sourcing this 'free' music from, and thus we wouldn't like to comment upon the legality of their operation. Whether you use them, then, is totally up to you.

Free Music Download

Maybe we're old cynics but as soon as we saw this app's description in Google Play ("Free Music Download lets you download free mp3 music copyleft [sic]") – we knew that it'd lead us to tracks by major artists too. Sure enough, using the search function uncovered pretty much every song from the UK Top 10.

In fact, in most cases several results were returned. Finding any of the promised copyleft tracks is difficult because, unlike similar apps, Free Music Download doesn't have any kind of category headings. The only way to find stuff is to use the search field.

“ Unlike similar apps, Free Music Download doesn't have any kind of category headings. The only way to find stuff is to use the search field ”



▲ *Free Music Download is about as simple as it comes but it works and can uncover a treasure trove of tracks*

Is the offering of tracks by major artists legal? Who knows? Our best guess is that the app searches various audio websites, such as SoundCloud. We hear that some apps like this simply search YouTube and strip away the video, serving the audio found there. Sometimes tracks are released entirely legitimately on such services by way of promotion. Sometimes they're uploaded by the site's users (and deleted quickly afterwards by site admins). However, as it stands, Free Music Download offers you, as an end user, no way of knowing about legalities because you're not informed of the provenance of each track. It's up to you whether you're happy with that.

Tapping any track in the list of results then attempts to load its lyrics – a procedure that we found failed at each and every attempt. Still, this is hardly a make-or-break feature. At the bottom of the screen is a play button, alongside a Download and Share button. Playing will download the song and play it as it does so. Clicking Download simply downloads the track. In either case, the song will end up in a Free Music Download folder within the Music folder on your device, where it can be played by pretty much any music app that's able to access the file system.

By clicking the Download tab you can view the progress of downloads. Many failed in our tests but all that meant was again tapping the Search tab and choosing a different entry within the list of results. Inevitably on our second try the track would download. The download

list is borderline useless, however, and only shows download progress. There's no way of viewing all the tracks you've downloaded, for example. The only way to do that is to use a file browsing app to view the Music folder.

Perhaps surprisingly, that's about all there is to the app. We get the impression the developer didn't get much beyond the early chapters of Android Programming for Dummies, and created the app mostly as a cash cow to serve adverts – full screen versions of which appear after virtually every operation, such as switching between Search and Download tabs. Still, this seems a fair price for what you get and, additionally, simplicity isn't necessarily bad in the world of apps. Ultimately, Free Music Download does exactly what it says on the label.

As with many music download apps on Android, Free Music Download appears to be a clone of some unknown original app. Apps that are identical in look and functionality include Music Paradise, Mp3 Music Download Free, Download Free Music and 10s if not 100s of others.

GTunes Music Download

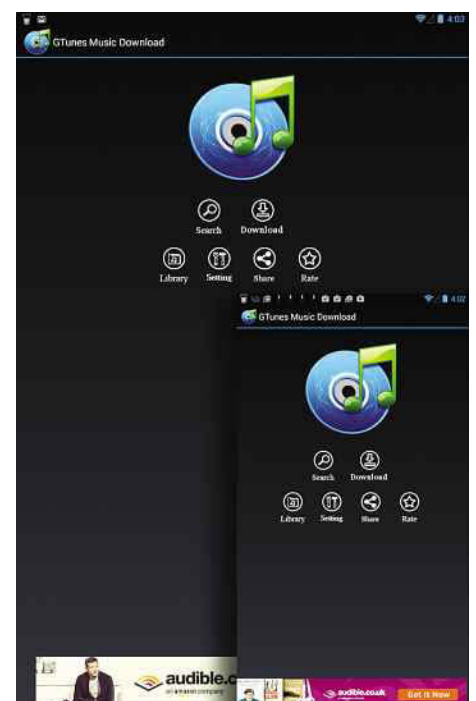
This is yet another app that's not going to win its creator any design or innovation awards, and that also appears to have been cloned a thousand times (to the extent of other apps even stealing the name; the version we reviewed was from 'freddendoza'), GTunes is at least a little bit more sophisticated than some. Again, it lets you search for, and download, music

tracks in the form of MP3s. This time there's no pretence about copyright, but the app description in Google Play is clever enough to keep things concise, and thus suitably blurred when it comes to detail: GTunes lets you get hold of your favourite music. Unfortunately, how this is achieved is simply not mentioned.

The app opens to offer Search, Download, Library, Setting, Share and Rate icons. It's exactly the same on both phone and tablet, the latter of which is treated as a large phone, and with the end result that everything looks ugly and portrait orientation is enforced. However, the app is otherwise functional.

Tapping the search button loads a full-screen ad, despite the fact you haven't actually done anything yet, and subsequently a search field appears. You're prompted to type the song, artist and/or album name within a single search field. Alongside this field you can select I, II or III from a dropdown menu. We have no idea what this means. Our best guess is that it switches between searching for song, artist and album title, as the input field suggests, but the results seemed random in our tests. Perhaps it switches music search engines?

Once you click the search button an impressively long list of results typically appears. Selecting any entry in the list causes a menu to pop up showing Play Now and Download options. The former



▲ *GTunes is basic but works just fine in providing access to lots and lots of MP3 tracks. Just don't ask where they come from*

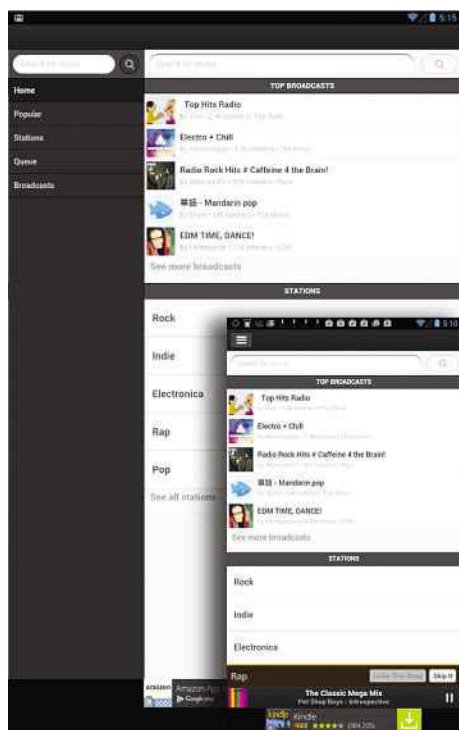
option downloads and displays lyrics along with a small track or artist thumbnail image. Sometimes lyrics appeared correctly and sometimes not at all. An Album button seemingly lets you switch between lyrics and a listing of other tracks on the same album, although this didn't work in our tests.

Perhaps surprisingly, when you opt to play a track, all you get is a play button that turns into a pause button once tapped to begin playing the song. There's no option to repeat the track, or cue through it, although this does appear when you opt to playback already downloaded tracks.

Another strange feature is that all tracks are placed in the SMDMusic folder on your device. We've no idea what SMD stands for, or why the track isn't simply placed in the Music folder. This could be a pain if your favourite music playback app only looks in the latter folder, though, as it would require some manual shifting around of files.

Sometimes the app got it entertainingly wrong in our tests. Searching for *It's A Sin* by the Pet Shop Boys started playback of *What Have I Done To Deserve This*, while the thumbnail image was of three blokes we simply didn't recognise.

This aside, and also ignoring the somewhat heavy handed attitude to displaying adverts, there's little doubt that GTunes provides access to a serious amount of music.



▲ Musica is a streaming service that offers instant access to just about every pop music you can think of – impressive!

“ Musica’s ability to find artists, songs and even entire albums is simply unmatched by other apps in this comparison ”

Musica

If your data plan is sufficient to support streaming, or your Android device is always within range of wi-fi, then Musica might be your silver bullet for finding music. How this is achieved is (once again) simply not explained, but Musica's ability to find artists, songs and even entire albums is simply unmatched by other apps in this comparison.

The app opens to a search field, plus Top Broadcasts and Stations lists. Top Broadcasts are collections of tracks put together by other users, although it isn't clear how – we couldn't find an option to create our own Broadcast, for example. All Broadcasts are themed around concepts or musical styles. To listen in you have to 'join', which shows the track listing and history of tracks that've already been played. Alas, tapping these does nothing – they're for information only. A clue as to the origins of Top Broadcasts is found if you tap the Follow link while listening, whereupon a Grooveshark login appears. Is the app (or at least this part of it) just an interface for the Grooveshark music streaming website? We suspect as much.

The Stations link is far more generic – you choose between Rock, Indie, Electronica, Rap and so on – and as soon as you tap you're treated to music in that genre. You can opt to skip tracks if they're not to your tastes, and tapping the track information button at the bottom enlarges the playlist display, which shows tracks that have been played or skipped.

However, it's the Search function that most people will use. This lets you search for artists, songs or albums. Results are shown under Songs and Albums headings, and as you might expect tapping entries listed under either allows you to listen to the track/album immediately or add it to your playlist (either as the next track to be played, or to the bottom of the playlist, which is a nice touch). Although the album feature is not quite perfect – we found some songs got listed twice or even three times in album listings, meaning you can't simply add all the tracks without encountering frustration – the ability to call up just about any album for instant

listening on demand – and for free – is not to be sniffed at.

While listening to individual tracks it's also possible to tap an I Like This Song button. It's not clear what this does but, based on similar apps, we'd guess it helps Musica learn your tastes. However, there doesn't appear to be any feature within Musica to use this information to generate playlists. Curious.

Tapping the menu button also lets you switch quickly between Broadcast and Station lists, and also adds in a Popular option, by which you can access tracks that are proving popular with others. As you might expect, this is very similar to the Top 10, although with an international feel.

Musica isn't the tidiest of apps and its interface feels too basic for the suave service it's offering. Adverts are always visible too, and as with so many apps a tablet is essentially treated like a large phone. However, these are really minor complaints for an app that we suspect provides instant access to virtually every pop song you've ever heard – provided you can spare the bandwidth.

Listen To Music

This app has a peculiar problem that we've not come across before: its user interface is in Spanish. Although offered on the UK Google Play store, complete with an English-language description, it seems nobody has bothered translating the actual app.

The partner app of www.ritmomp3.com, even after visiting the website we couldn't even workout whether Listen To Music is European or Latin American in origin (our hunch is the latter). Perhaps surprisingly, this doesn't really matter providing you apply a little common sense, and perhaps a little Google Translate too.

The app opens to a list of Top Canciones (Top Songs). Some of these tunes are South American in origin but many are the same old western artists that you know so well, although perhaps with a US bias – so a little more Country music in there than you might be used to. Tapping any track starts it playing instantly, and playback can be controlled using the icons at the bottom of the screen. Music is streamed rather than downloaded, and notably there's no lyrics

or artist/song artwork. Tapping the menu button lets you switch to Top Artistas (yes, you translated correctly), Géneros (category listings), and Mis Favoritos (again, you guessed right). You can favourite tunes by tapping the star icon at the left of the transport controls at the bottom of the screen. Your favourites lists essentially acts as a personal playlist of tunes.

As usual in apps like this, of most interest is the search field at the top of the screen. Here you can type artist or song names and the results are just like in other apps reviewed here – and nearly always impressively long too. It didn't really work when searching for albums, however, which is a bit of a let down.

Adverts are present at the bottom of the screen at all times, and full-screen adverts frequently appear (although don't stop the music playing). These are perhaps acceptable considering the wealth of music you're getting access to.

However, that's about all we can say about this app. It's pretty simple in execution and use, which is why the Spanish-language interface isn't really that big an issue at the end of the day. It works fine on tablets – although, again, it treats them as large phones.

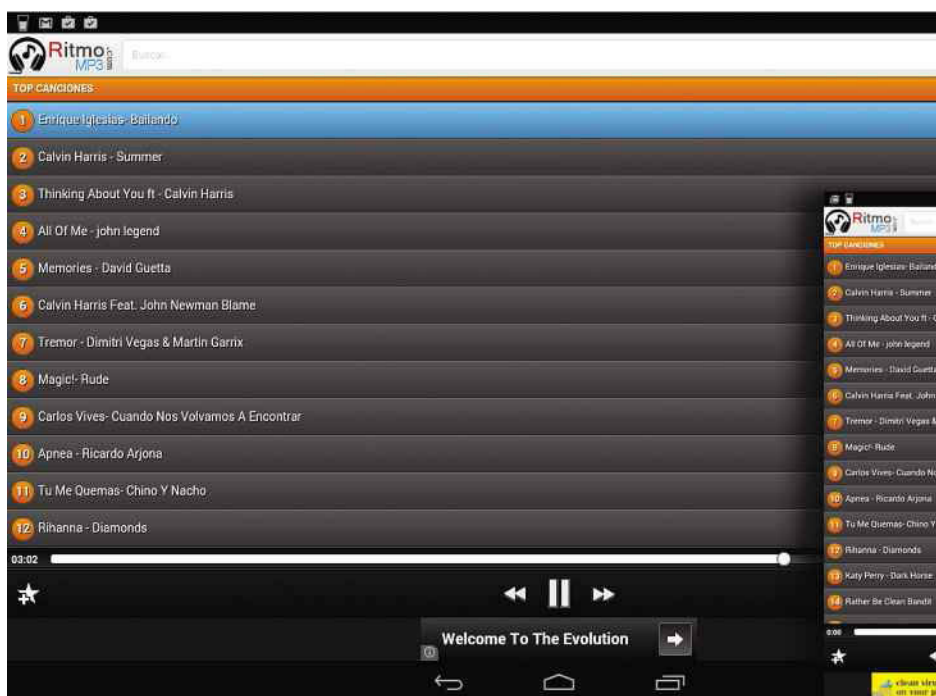
As with the other apps here we've no real idea where Listen To Music's content is being sourced from, but if you're after that elusive track and none of the other apps satisfy then it's certainly worth installing and trying.

Top Musica

The statistical likelihood of having two Spanish-language apps in our group test is low, but Top Musica is yet another app originating (probably) in South America. It appears to be a spin-off of the **gomusic.fm** website. Like Listen To Music, reviewed above, it provides streaming access to both western (ie Katy Perry, Coldplay etc.) and Latin pop (Romeo Santos, Ricardo Arjona etc.), although this time the app has significantly more helpful organisation that aids searching and exploring.

The app opens to circular badges representing mainstream pop music types: Country, Kpop, Metal, Rap, Punk, and so on. Some labels are in Spanish but you'd have to be pretty dumb not to be able to work out what they are: Christiana, for example, or Electrónica.

Selecting any of these badges then shows a range of artists badges, complete with images to aid selection. Once you select an artist you're shown a track listing and can sort this alphabetically, by the most popular titles, or even by album.



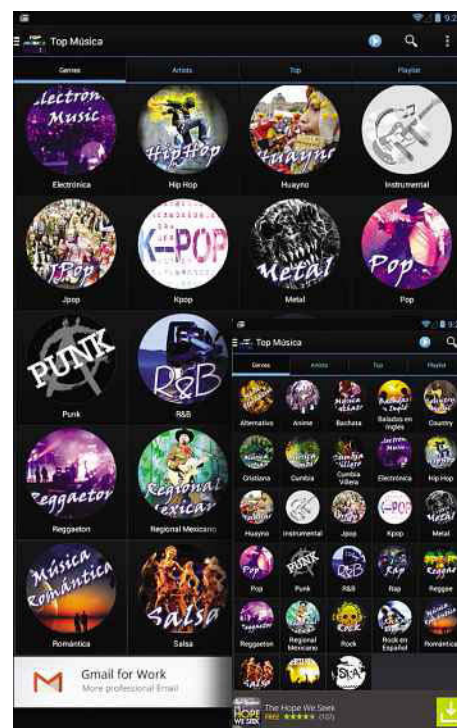
▲ Its interface might be in Spanish but Listen to Music is simple to use and also very powerful, finding tonnes of songs in our test searches

“ Despite starting out with scepticism, Top Musica won us over with a simple yet effective interface and true access to just about any artist ”

Selecting Michael Jackson and sorting by most popular showed 70 tracks in total – perhaps a small excerpt of his output, although one that contained virtually every song of his we could think of off the top of our heads. Selecting Coldplay and switching to album view showed every one of their LPs as available, complete with full track listings.

Selecting a song plays it immediately, and brings forth with transport controls and a thumbnail of the artist – and there's also an option to add it to a playlist. Clicking the musical note icon switches to showing lyrics for the song currently playing, while clicking the track listing button returns you, naturally enough, to the earlier track listing.

‘Despite starting out with scepticism, Top Musica won us over with a simple yet effective interface and true access to just about any artist, song or album you might want – provided you're under the age of 25. Full-screen adverts appear occasionally, but nowhere near as frequently as other apps reviewed here, and there are banner adverts on the screen at all times. **mm**



▲ Top Musica provides access to artists, songs and even entire albums with just a few clicks, although is streaming only

Remembering... Windows For Workgroups

David Hayward shows his appreciation for a Microsoft triumph

Windows was an amazing concept the first time we ever laid eyes on it. It was something like 1990 and we were happily tapping away at the keyboard using DOS 3.3, completely oblivious to the joys a GUI could offer on our brand new PC.

After a friend popped by, though, with an armful of disks, an hour or two later we were sat in front of Windows 3.0 and it was amazing. True, the games we used still required DOS, and they wouldn't run if you had Windows loaded, due the amount of memory it used. And Word Perfect or Word Star (whichever it was at the time) still loaded up through DOS. But everything else, like the sound recorder – especially if you had the Multimedia Extensions a year later – and support for Sound Blaster cards, was amazing. It was the future.

Later on, though, things began to get a little more interesting. With a job in IT being the daily norm, we found ourselves in front of the upgraded version of 3.0, Windows 3.1, and since we had to deal with networking, Windows 3.11 for Workgroups.

Windows 3.11 for Workgroups was a great OS. It had its little quirks, but on the whole it ran exceptionally well and made great use of the hardware it was installed on. It was also the first time most of us had experienced a networked operating system, which meant we had to deal with all manner of issues and train ourselves in how such things as TCP Winsock, IPX/SPX, sharing files, folders and printers and boot ROMs worked. It was a fascinating time and one where we lapped up and took in the slightest detail like a proverbial sponge.

Its History

Windows for Workgroup was actually an extension to the original Windows 3.1 release a year earlier. It arrived on the scene late 1992 and brought with it a more serious side to Windows beyond the home for the business user.

It was, as you can tell, a part of the Windows 3.x release family, and there were four versions: Windows 3.1, 3.1 for Workgroups, 3.11 and 3.11 for Workgroups. Basically they all shared the same core but with patches and improvements from each previous version. So Windows 3.11 for Workgroups was in fact the one that everyone chose, as it was the more advanced and updated of the four.

Windows 3.11 for workgroups lasted some years, until 1995 when Windows 95 was launched and the entire look and feel of the GUI changed forever.

Did You Know?

- You could intercept Microsoft Mail emails at the Post Office share and read them. Very naughty.
- Remote Access Dial-up was built in, allowing you to connect another machine or BBS.
- Windows 3.1x was the first Windows to introduce the registry.
- And it was the first Windows to be able to launch external programs from Command.com.

The Good

Windows 3.11 for Workgroups was extraordinarily easy to get up and running and connected to a network. The internet, as it was back then, if attached to a decent network and T1 line, was blisteringly fast.

You could also copy the entire DOS 5/6 and Windows drive structure to a server and copy it back down to a new PC in a matter of minutes, complete with every program and setting.

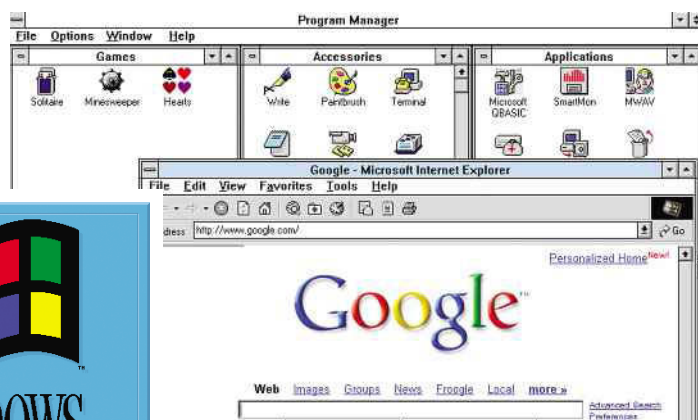
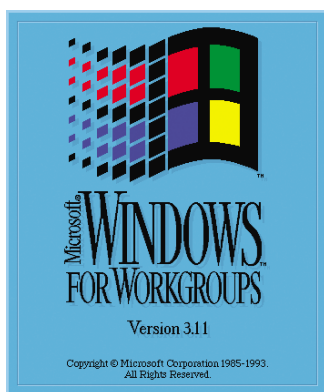
The Bad

8.3 filenames and the cheat for networked Hearts that everyone else seemed to know except for you.

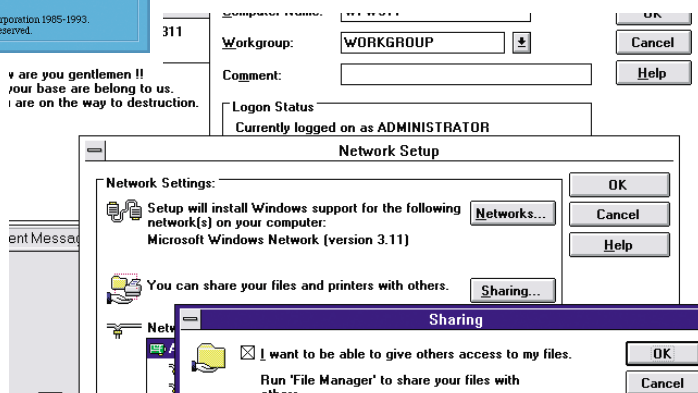
Conclusion

Well done, Microsoft, Windows 3.11 for Workgroups was a great GUI, and when combined with the rock solid DOS 6.22, it was bullet proof. It taught many of us how to network and how to fix all manner of computing problems, and it gave us better access to the wider world that was evolving around us at a rate of knots.

Why oh why do things these days have to be so overly complicated?



- ▲ *Windows for Workgroups 3.11 – a wonderful GUI*
- ▲ *And one that can still handle the modern internet, mostly*
- ▲ *Setting up sharing and connecting to network resources was extremely easy in WfW*



The Things That Frustrate Us About... WhatsApp

All the cool kids are using this new chat app, but it's definitely not annoyance-free

Instant messaging apps are nothing new – where once there was AIM and MSN Messenger, now there's Google Chat and Facebook Messenger, plus all the other millions of ways we can talk to one another via mobile phones. WhatsApp is one of the newer chat apps that's become popular, because it lets you talk to the people in your phone's contact list without using up text messages (just your data allowance). It's quick and straightforward and has over 400 million users worldwide, and if you're not already using it, well, your friends probably are.

As always with these things, though, WhatsApp has a few weird quirks that can quickly get irritating. Here's how to cope:

Who?! You Can't Delete Contacts

One of the handy things about WhatsApp is that it automatically adds the contacts stored on your phone to your contact list, without you having to manually add people one by one after checking if they even use WhatsApp. There's an unfortunate counterpoint to that, though, which is that everyone stored in your phone automatically gets added to your contacts list. And there's no way to delete them without deleting

their number from your phone completely. So now you have your boss on your contacts list, and your ex, and half a dozen random friends you haven't spoken to in years on there. In my case, I managed to add an Ikea driver I'd previously called to sort out a sofa delivery to my contacts. Oops.

Fix it: Well, the obvious thing to do is to clear out your phone's contacts. If you never want to hear from these people again, why hang on to their numbers? If you do need to keep hold of their phone numbers, though, you can block individuals in WhatsApp so they can't contact you: tap their name, hit the menu button, select 'more' and you'll find the block option.

Argh! Too Many Group Messages!

Another useful feature of WhatsApp is the ability to sort people into groups and then send out group messages. Cringing already? Yeah. Those kinds of features almost always get abused. Who among us hasn't been annoyed by irrelevant Facebook group messages or mass emails? There's always someone who decides to message an entire group of people instead of an individual or who spams like mad about their latest

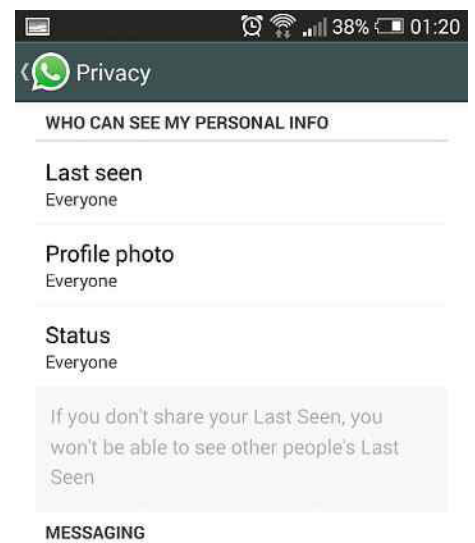
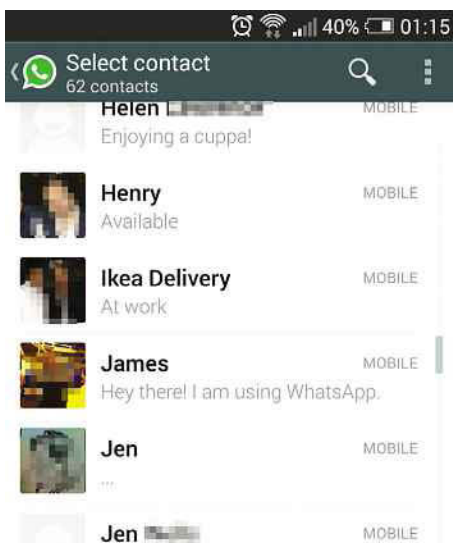
project. WhatsApp's group chat gives them another way to contact you.

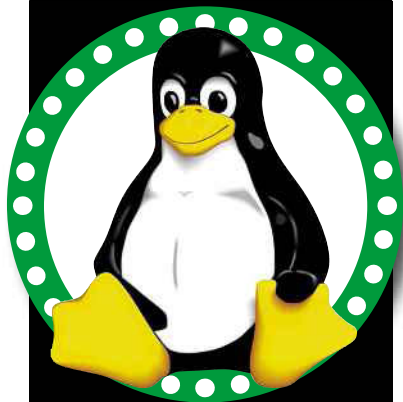
Fix it: You can opt to leave a group by tapping on the group chat and then hitting the 'delete and exit group' option. Or you could get in touch with the person who's annoying you and ask them not to spam you, but most of us would probably rather find a less confrontational way of escaping!

Yikes! 'Last Seen' Is A Bit Stalky

When someone doesn't reply to a text, you can always tell yourself they haven't read it yet. When someone doesn't reply to a WhatsApp message, though, you'll know if they've read it, because the app includes read receipts – which means people can tell when you're avoiding them, too, and WhatsApp even handily displays the time you were last active on your account. Bit of a nightmare if you don't want someone to know what you're up to.

Fix it: Tucked away in the privacy menu is an option to turn off your 'Last Seen' and read receipts. Turning yours off means you don't get to see anyone else's, but maybe it's better that way. [mm](#)





David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Linux

Ultra-Powerful Linux PC? Why?

Why spend over £1,000 on a PC for Linux?

This week had me wondering why on earth someone would buy a £1,800 PC only to go and install the latest Ubuntu on it. Let me explain.

A friend recently told me of the new PC he'd bought for himself. It was quite a grand affair and consisted of the latest MSI gaming motherboard, Intel Core i7 CPU, 32GB of RAM, CrossFire AMD R9 290X 4GB DDR5 graphics cards (a pair of them), two 1TB SSDs and a water cooled case that looked like it had just arrived from some distant time in the future. To be honest, I was quite jealous of the setup.

When I asked him if he intended to stick with Windows 7 then move on to Windows 10 when it was released (thinking that he'd avoid Windows 8.1), I was fairly shocked by his response. "No, I'm installing 14.04," he said.

At first, I thought it might be as a part of a dual boot setup, with Windows 7 as an option, but I was wrong; it was 2TBs of SSD Ubuntu.

But... Why?

My friend is a PC gamer, he does a spot of report writing for work, he browses the internet (mainly Facebook), and he watches films. Well, this hardware is definitely capable of dealing with these tasks.

champion its growth and uses. But when I see someone spending so much just for a machine that's only running Linux, I do have to take a step back and wonder why.

In my humble opinion, using something of this performance

“ The kit I run Linux on is about seven years old, and it runs perfectly well ”

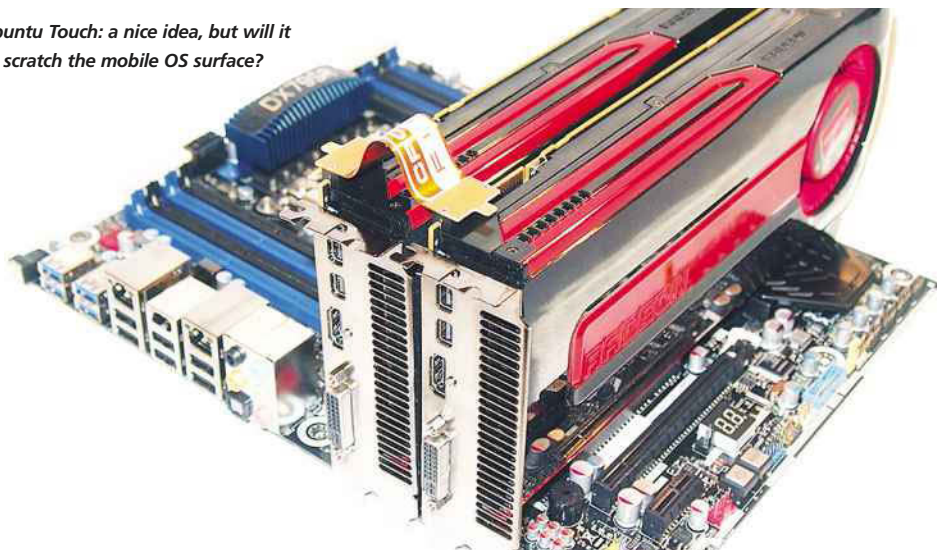
The OS, however, is what got me. True, Linux has some fine games available for it, and things are getting somewhat better, at least compared to how they were a couple of years ago. But the drivers for AMD on Linux aren't anywhere near as good as those for Windows, and the vast majority of games available (he likes first-person shooters) will happily run on a system that has a tenth of that power and cost.

I like Linux, don't get me wrong, and I'm happy to

and price is wasted on just Linux alone. If it was dual boot, with Windows 7, then I could understand, because then you can enjoy the best of both worlds and the best PC gaming Windows has to offer.

Maybe I'm being too much of an old meanie. The kit I run Linux on is about seven years old, and it runs perfectly well, even with a spot of gaming thrown in. Either way, it'll be interesting to hear what you think. Is this too extreme for just a Linux PC?

▼ *Ubuntu Touch: a nice idea, but will it even scratch the mobile OS surface?*



News Bytes

Sven Harvey returns with more Amiga news

Disk Pack

As part of its Amiga Forever Classic Support series, Cloanto has made a downloadable image pack of Workbench (and Kickstart) floppies and hard drive images available for purchase, as well as available via selected retail partners on physical media as appropriate.

The set makes it possible to boot and set up any Classic Amiga model (including the Amiga 1000, 3000 and 4000T) using a floppy drive emulator or after copying to suitable media (floppy disks, CompactFlash cards, etc.)

The pack includes 16 floppy disk images including complete disk sets of Workbench 1.3 (two disks), 2.1 (five disks) and 3.1 (six disks) as well as the Superkickstart for the A3000, a Kickstart disk for the A1000 and the game-saving Relokick disk. Hard disk image files including upgrades to system file, are also included for full Workbench 2.1 and Workbench 3.1 installations.

The downloadable disk pack is available now for \$9.95 (or €9.95 inclusive of VAT), and you can find out more at www.amigaforever.com/media (which includes links to the full breakdown of improvements to the hard disk installation images.)

AmiKit update

The latest version of Amikit, 8.2, is now available. This emulation package requires Kickstart and Workbench files from Amiga Forever to function but provides a high-end classic-based emulation environment offering the best classic Amiga (i.e. pre-AmigaOS 4.x) experience on non-Amiga hardware.

The new version includes the new MUI 4, which is also

Image FX

In another swoop for a big name from the old days, A-EON Technology has purchased the former Nova Design's image manipulation and digital effects package. In a deal with Woodall Design, which took on Nova's IP when Nova closed, Image FX joins Aladdin 4D once again under the same umbrella, at least for the Amiga and Amiga-like platforms.

Nova Design first released Image FX in 1992, and it got regularly updated up to version 4.5 and then 4.5 Studio, with AmigaOS 4.x and MorphOS support. The application quickly became a mainstay of artists' and video producers' creative arsenal, especially with animation and the folding in of previously separate PowerPC modules into the core program. CineMorph was originally a separate program, which provided cinematic quality image morphing, which later in Image FX's development became part of the standard package.

The deal means that A-EON Technology now owns all the rights to Image FX, CineMorph and the trademark to Cinematte, which was Nova's blue-screen compositing software, which allowed different graphical elements to be combined easily and with great results, be they from still images or video using the blue-screen method (now usually green-screen). Cinematte also transformed into a Photoshop and Aura add-on later in life.

Kermit Woodall, former president of Nova Design LLC seems quite happy for the programs to be going back into development after

a few years being fallow: "While all of Nova Design had moved on to other things, we always regretted not being able to push Image FX further and do more with it. We're so glad to be able to turn it over to a new company with exciting plans! "

Previously, Aladdin 4D and Image FX linked into each other with data sharing (also with Lightwave).



known as Magic User Interface and essentially upgrades and enhances the Workbench GUI. Also included is a small jump and run platformer called *Boxx2* and an updated version of the Amikit app for Android, which now has a graphical user

interface, making it much more palatable for users to give it a go.

The new version can be downloaded for free or purchased on a high-quality 8GB USB stick. You can find out more at www.amikit.amiga.sk.



Sven Harvey has been our Amiga specialist for over 14 years, drawing on his 23 years of retailing computer and video games and even longer writing about them.

Amiga



Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Mobile

Money For Old Tech

Ian McGurran trades old for new, but is it worth it?

Mobile technology moves fast. What was fast and fun two years ago may not quite cut the mustard these days. But what can you do with this now useless kit? Sell it? Maybe, though the turnover of technology is keeping gadget resale values down. There is an alternative, however, because many manufacturers are starting to offer what the motor industry has done for years: the trade in. The trick here is to get it to work to your advantage. Take Asus's latest offer of £50 against its current MeMOpad 7 tablet – a pretty decent deal itself, made all the better by trading in that old 7" tablet gathering dust. How easy is it?

For the purposes of this test, I've grabbed an old Chinese tablet that set me back the princely sum of £16. It's frankly a rubbish device, so it won't be missed, but more importantly, it's one that fits the requirements of the offer: "It must have a diagonal screen size of 7" or more and be complete and undamaged (reasonable wear and tear excepted)".

The trade-in process is much the same as the tried and tested cashback processes. Most of these have thankfully caught up with technology, allowing you

to send a scan or image of your receipt as proof of purchase, along with the device's serial number. Then it's a case of sending your old device, freshly wiped and nicely packed of course, off to their recycling centre for approval. Protip: don't skimp, send using at least recorded post for peace of mind and proof of delivery. Then some 30 or so days later, you'll have the £50 credited to your nominated bank account. Really, it's no more challenging than an eBay sale.

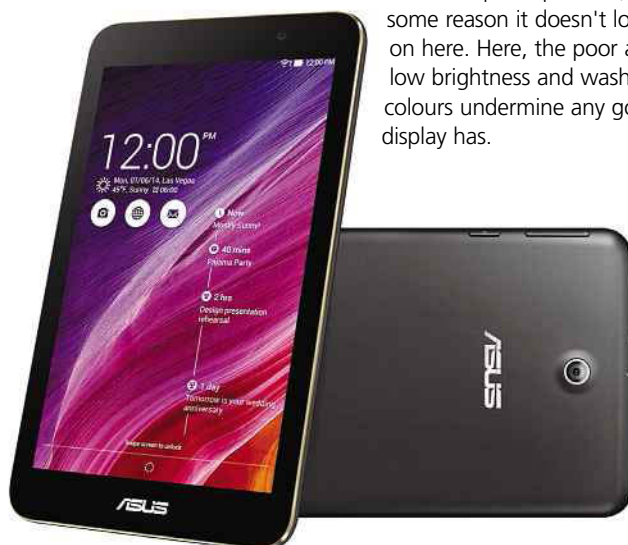
So to the new tablet itself, the £99 Asus MeMO Pad 7 ME176CX. That bit on the end is important, distinguishing this tablet as the 2014 quad-core Intel version with a 1280 x 800 screen (not the lower-res 2013 version). That's the same Intel quad-core CPU that's been dominating low-end Android and Windows 8.1 tablets since the latter half of 2014. It's clear to see why too, as the MeMO Pad 7 ME176CX has no issue with speed; it's as snappy and fluid on here as it has been on pretty much all other devices using it.

Not quite as stellar, however, is the screen. The resolution isn't bad at all (the Kindle Fire HD makes for great reading at the same 216 pixels per inch), but for some reason it doesn't look great on here. Here, the poor angles, low brightness and washed out colours undermine any good the display has.

Asus's Zen UI is actually pretty good. Taking the best bits of MIUI and TouchWiz, there are quite a few clever features that you wouldn't normally get on a budget tablet, such as split-screen apps. It's Android 4.4, though, and don't expect any ROMs, because the bootloader is locked. The final nail in the coffin seems to be mediocre battery life, Chrome swallowing as much power as HD video, and more than 15% lost in standby overnight, even in power saver mode. These days, and with Intel's power-sipping tech, that's not good.

When you can stump up another £30 for a Hudl 2 or Lenovo S8, the MeMO Pad 7 ME176CX is a very hard sell. Inside they are all the same, but the others' full HD screens put them in another league. However, things are very different when you look at the MeMO Pad 7 ME176CX as a £50 device. For that kind of outlay, it's much more of a bargain, and many of the shortcomings can be overlooked, especially since, bar a refurbished first-generation Tesco Hudl for £69, anything else at that price is basically suitable only for landfill. The bottom line is this: for £99, it's lacking, but for £49, it's untouchable. That doesn't make it a better tablet, mind, just lighter on the wallet.

Asus isn't the first to offer this kind of promotion. Windows tablet purveyor Linx is currently offering much the same for its line of Windows 8.1 tablets, with a £30 trade in on its 8" device (currently £89 on Amazon) being particularly appealing. If anything, this could happen more and more, and possibly, with the rise in sales of SIM-free phones, we could even see it happen with mobiles. So maybe it could be time to see what you can fish out from the bottom of those man-drawers...



Spatial Unawareness

Be more economical with your storage by buying a NAS device, says Andrew Unsworth

Much like the ocean lapping at a sea shore, adequate storage space comes in waves. At certain times, such as when the floppy disk was eclipsed by the Zip disk and CD, storage appears so vast that we kid ourselves we'll never fill it. Then, as technology and software evolves, storage media that once seemed so cavernous seems so unfeasibly tiny that we wonder how we ever considered it practical in the first place.

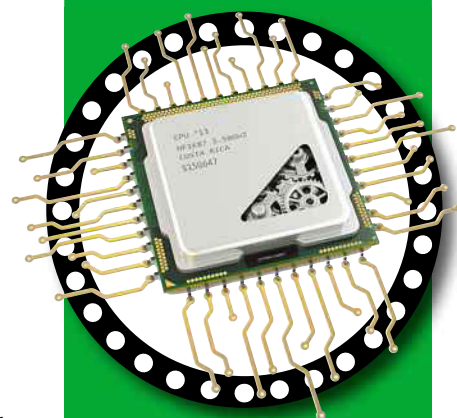
I've come to realise that right now we're at the point where persistent storage is again much cheaper and more capacious than ever before. Consider the Western Digital 6TB hard disk. 6TB is an immense amount of storage space, and I can't imagine myself filling it up, even though I know the time will come when its contents will be packed tighter than a hipster's love-spuds in extra skinny jeans.

However, I do believe the time taken to fill it will be severely reduced thanks to the WD Red's main application: network-attached storage (NAS). For us consumers, NAS devices let us store our treasured photos, videos, music and documents on one or more disks, and we can upload files to NAS devices from practically any device or computer. Many NAS devices will even let you connect to your NAS from the internet, so that you can bore wow people at the bus stop with your holiday snaps using your phone, laptop or whatever.

All but the most rudimentary NAS devices let you configure and maintain your data volumes with basic operating systems, but because there's no desktop operating system installed, and because you aren't adding and deleting various programs and clogging up the OS with rubbish, you're less likely to fill it up as quickly as you would a laptop or PC's hard disk. As an example, the primary volume in my NAS device is 500GB, and it's only 69% full, even though it's chock full of my tunes, photos and home videos. I'll eventually run out of space, but because I only ever upload the files I use and want to keep, I've been

able to use the same disk for the last three years and will continue to use it for at least another two.

I've found that NAS devices really do make you more economical with your data and make your disks go further. At the time of writing, the WD Red 6TB is £220, but you can pick up a 2TB drive for just £58. Now is a great time to buy storage, whether it's a hard disk, an SSD, USB flash drive or whatever. As for me, despite much evidence to the contrary I know I'll need to invest in higher-capacity disks sooner rather than later, but I still don't see how I'll ever fill them.



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none

Hardware



Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

Gaming

To Be This Good Takes Ages

With Sega reducing its staff and moving its US base of operations to save costs, small yet much-loved PC titles like *Total War* and *Football Manager* are likely to be its main focus in the future

This week, Ryan looks at Sega's renewed focus on niche PC games, and checks out Tripwire's gory shooter, *Killing Floor 2*...

Plug & Play

From its hit arcade machines in the 1980s, to its 90s peak with the Sega Mega Drive and *Sonic The Hedgehog*, Sega is one of the oldest and best-known names in gaming. The start of the new millennium saw a major shift at the company, though; the arcade scene was dwindling, and the Dreamcast failed to compete effectively with Sony's mega-selling PlayStation 2. Thus, by 2001, Sega had abandoned the hardware market altogether and was focusing its energies on producing software for other systems.

For the past 15 years, Sega's found success as a publisher of such games as *Football Manager* and *Total War*, while various titles starring Sonic have continued to bring in revenue – but recent times have clearly been tough for the company, with last year's *Sonic Boom* receiving largely woeful reviews, and even the much-vaunted *Alien: Isolation* only selling modestly.

On the 30th January, Sega's owner, Sammy Holdings Inc, revealed that it was planning a series of drastic cuts. Largely affecting Sega of America, these will see its headquarters move from San Francisco to Southern

California in an effort to reduce costs. At the same time, it was revealed that "about 120" jobs are to go, with Sega looking to offer "voluntary retirement" packages to around 300 staff in total.

The cuts are part of plans to move away from the console market and towards "growth areas," which, Sammy's statement says, are "digital games, centred around smartphone and PC gaming."

This points to a greater focus on publishing games like *Football Manager* and *Total War* – relatively niche titles that enjoy a strong hardcore following. Developer Creative Assembly is on the cusp of releasing *Total War: Attila*, while the series is in the process of moving into the online multiplayer space with *Total War: Arena* and *Total War: Warhammer*. Sega also owns Relic and Atlus, two studios which also specialise in relatively small yet reliably successful titles like *Dawn Of War II*.

Sega's focus on mobile and digital PC games could, however, mark the end of games like *Alien: Isolation*. It was recently reported that *Isolation* had passed the one million sales mark – a milestone that sounds

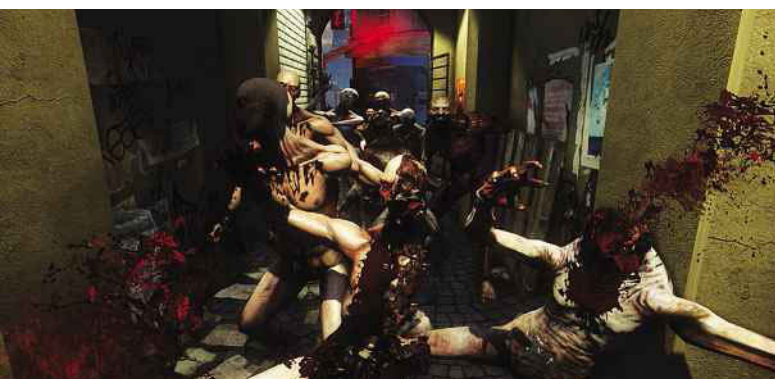
impressive enough until you consider that it was an expensive, AAA title that was widely expected to be a return to form after the sorely disappointing *Aliens: Colonial Marines*.

Despite strong reviews and plenty of scope for a sequel, it seems likely that producing another *Isolation* game will be considered a risk too far when compared to the more reliable performance of the *Football Manager* and *Total War* franchises. For Sega, it seems, the future lies in the PC niches, where profits are smaller but easier to predict.

Online

To find the reason why zombies continue to be a ubiquitous presence in gaming, you only have to look at something like *Killing Floor*. The undead are the ultimate moving target: human-shaped, but vicious and inhuman enough that, when you start blowing their arms and legs off and possibly even cackling with glee as you do so, you don't have to feel too guilty about it afterwards.

The original *Killing Floor* began life as an *Unreal Tournament* 2004 mod, before becoming a successful zombie blaster in its



▲ *Killing Floor 2* comes a long way from its roots as a UT 2004 mod 10 years ago. Now, with mo-capped zombies and a more advanced engine, the sequel – *Killing Floor 2* – is due out this year

own right. *Killing Floor 2*, due out this year, aims to up the gore quotient still further, with more guns, more zombies, and even more dismemberment than ever before. Production values have been improved, too, with the game's various infected ghouls now motion captured to give a more realistic sense of movement.

Improvements to the game engine also mean that all those motion-captured zombies will react more dramatically to your arsenal of guns, bombs and swords – developer Tripwire have revealed that each type of zombie has 22 points of dismemberment, which the team have dubbed its "Massive Evisceration and Trauma system". You can probably imagine what the gruesome results will be.

Beneath all the gore and mayhem, though, *Killing Floor 2* is just as it always was: a frenetic shooter that revels in its simplicity. It's a direct and deliberate contrast to Tripwire's own *Red Orchestra*, a series which has long aimed for a sense of gritty realism. "Killing Floor is a simple game," creative director Bill Munk told *PC Gamer*

last year. "You have weapons. You see something that looks messed up. And you kill it. You get money for doing it and you buy better weapons. Rinse and repeat. The more enjoyable that small little loop is, the more successful the game is."

Killing Floor 2's arcade-like shooting will be joined by a range of more modern elements like a perk system and levelling, while the level designs themselves will offer a modicum of strategy or planning – accidentally take out a street light, for example, and you could find yourself plunged into darkness, and less able to defend yourself from the monsters closing in around you. Throw in a six-player co-op mode, plus talk of larger maps that will support up to 16 players later in *Killing Floor 2*'s life, and you have the makings of a rock-solid shooter sequel. Zombies may be plentiful in gaming these days, but Tripwire's commitment to the polishing the fine details of its sequel's carnage could be enough to separate *Killing Floor 2* from the flesh-eating horde following in its bloody footsteps.

Killing Floor 2 is scheduled to appear on Steam later this year.

Incoming

For the past decade, Traveller's Tales (now TT Games) has found extraordinary success with its series of Lego games. Starting with *Lego Star Wars*, the franchise has established a dependably entertaining mix of simple, fast-paced action and nostalgia – there's something strangely satisfying about seeing a classic movie scene recreated with Lego, after all.

In the wake of *Harry Potter*, *Indiana Jones* and *Lord Of The Rings* tie-in games, Warner Bros. has announced that two new major entries are joining the fold: *Lego Jurassic World* and *Lego Marvel's Avengers*. The former will, of course, provide a whistle-stop tour of the franchise Steven Spielberg

brought to the screen in 1993, with its story culminating with the fourth film in the series, *Jurassic World*, out this summer. Then there's *Marvel's Avengers*, which will be based on the 2011 blockbuster and this year's eagerly awaited sequel, *Age Of Ultron*.

We'd be surprised if TT Games did much to change the formula set up in its earlier Lego games, but then, with each title being such a huge hit, we can't necessarily blame it for being conservative. Now, when will they get around to making *Lego Walking Dead*?

Lego Jurassic World is out in June, while *Lego Marvel's Avengers* is more tentatively scheduled for the third quarter of this year.



▲ Warner Bros. has announced two new Lego games to coincide with some of this summer's biggest films: *Lego Jurassic Park* and *Lego Marvel's Avengers* will be out soon

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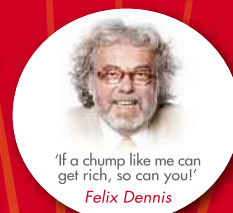
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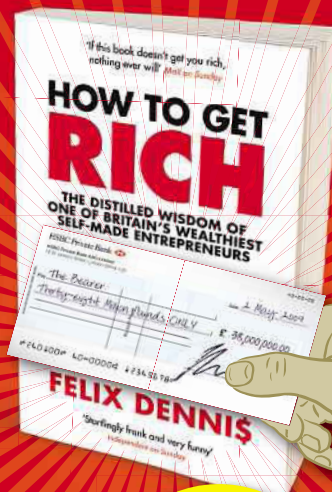
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POST

Simply fill in the form & post to:

Emma Corbett, Micro Mart, 30 Cleveland Street, W1T 4JD

◀ **NEW ADDRESS!**

Step 1

Write the wording for your advert in the numbered boxes below (one word each box). Maximum 30 words free.
Please complete in BLOCK CAPITAL LETTERS, then proceed to Step 2

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50
51	52	53	54	55
56	57	58	59	60

30 Words FREE Private Ads Only Trade ads MUST be boxed or reversed	Boxed		Reversed	
	Private	Trade	Private	Trade
	£6.80	£13.60	£8.00	£16.00
£1.70	£8.50	£17.00	£9.70	£19.40
£3.40	£10.20	£20.40	£11.40	£22.80
£5.10	£11.90	£23.80	£13.10	£26.20
£6.80	£13.60	£27.20	£14.80	£29.60
£8.50	£15.30	£30.60	£16.50	£33.00
£10.20	£17.00	£34.00	£18.20	£36.40

Step 2

Choose a category you would like your advert to appear in and tick the box.

- ☐ Hardware for sale ☐ Software for sale ☐ General for sale ☐ Accessories
☐ Hardware wanted ☐ Software wanted ☐ General wanted

Step 3

Complete all fields of your personal details and payment method.

Name

Address

Post Code

Landline Telephone No. Email

If I have more than 30 words, I have enclosed due payment. I am not advertising pirated, pornographic or any other kind of illegal software and my advert is both honest and legitimate. MM reserves the right to refuse or alter adverts at the discretion of the management. MM cannot be held responsible for the condition or quality of goods advertised. Your advert will be processed on receipt and will appear a.s.a.p. subject to space and availability.

Please tick appropriately ☐ Private ☐ Trade

I enclose payment by ☐ Cheque ☐ Postal order

or please Debit my Mastercard/Visa/Amex account No

Expiry Date:

Authorise payment for £



FAX this completed form to: 0207 907 6066

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To place an ad in our classifieds, simply fill in the form at www.micromart.co.uk or send your ad by post to Maaya Mistry, Micro Mart, Dennis Publishing, 30 Cleveland Street, W1T 4JD

HARDWARE FOR SALE

Have you got any old kit lying around you'd like to get rid of? Fancy making a few pounds while you're at it? Why not advertise in the Micro Mart classifieds? It's easy and it's free, just email what you've got, how much you'd like for it, and your contact details to micromart-classifieds@gmail.com, and we'll do the rest. There are thousands of enthusiastic readers out there looking for components every week, and you may have something unwanted they've been searching for, so get in touch and save your kit from going to the tip!

DDR2 memory sale. 2 x Nanua PC2 3700 256MB £6 pair, 2 x HP PC2 4200 256MB £7 pair, 4 x HP PC2 4200 512MB £10 pair or £18 for four.
Tel: Jeremy Gill (02089) 430683 Email: arthur.pewty1@virgin.net

Asus M2N2-SLI Deluxe motherboard bundle. With AMD Athlon 64 4000 CPU, 4Gb Corsair ram, fan, backplate, manual, driver CD. £40
Email: david.white38@ntlworld.com

IBM / LENOVO SFF BASEUNIT. P4 / 2.8 H-T, 2.0 gigs ram, 40 gig Hard Drive, CD-Rom, 10/100 Network, sound, USB, Clean install XP-pro, fully updated, Office Suite, Anti-Virus, & all usual utilities, COA Licence Sticker & Install media, £25
Tel: Pat (07710) 348638 Email: pat-4cars@aol.com

FUJITSU-SIEMENS MINITOWER. Pentium D 2.8 Dual-Core, 2.0 gigs Ram, 80 gig Hard Drive, DVD-RW, Gigabit network, sound, Clean Install XP-pro, fully updated, Office suite, Anti-Virus & all usual Utilities, Legal COA sticker & System Image. £35
Tel: Pat (07710) 348638 Email: pat-4cars@aol.com

DELL OPTIPLEX GX240 SFF. P4 / 1.6, 20 gig hard Drive, 768mb ram, CD-Rom, 10 / 100 network, Sound, Front USB, , Clean install XP-pro, fully updated, Works OK but slow by modern standards, £15.
Tel: Pat (07710) 348638 Email: pat-4cars@aol.com

LG Flatron W2246S 22" monitor. Includes power and VGA leads. No dead pixels in very good condition. £50 Buyer Collects from Verwood Dorset.
Tel: (01202) 826057 Email: geoffand-cynth@themailspot.com

2 x 512MB PC3200 DDR400. These two sticks were removed from my working system, now redundant. £5, plus £1 p&p.
Tel: Alan (02084) 202322 Email: alan@asandco.co.uk.

2 x 1GB PC2100-648. These two matched sticks were removed from one of my redundant systems. Plus one PC2700 (DDR 333Mhz) and one 512Mb PC3200 DDR400 stick. All for £5 plus £2 P&P.
Tel: Alan (02084) 202322 Email: alan@asandco.co.uk.

Two 120GB Maxtor DiamondPlus 9 Drives plus one 80GB Diamond-Plus 10. Can be supplied with two plug-in caddies. No reasonable offer refused.
Tel: Alan (02084) 202322 Email: alan@asandco.co.uk.

SANSUNG GALAXY Tab 3 for sale. 2mths old, 8gb, wifi, £80 open to offers. Willing to post at a charge.
Tel: Christine (01386) 831836

HP Elitebook 8760w i7 2820QM @ 2.2ghz 32GB RAM 750GB HDD Quadro 4000M GPU. Only 2 small marks on whole machine. Cost £3500 when new. £900 ONO
Tel: (07772) 926632 Email: stedaley19@gmail.com

WD 2TB desktop hard disk. Formatted ready for an operations system. Runs very nicely. New laptop means my desktop items must all go! £40 includes free tracked postage.
Tel: (01619) 501218 Email: jmbest2@sky.com

Asus P8Z68-v LX socket 1155 motherboard. Original box 1/0 cover user guide driver disk fitted core i3 2100 CPU 3-1GHz and 8GB PC1300 memory. No fan. Working fast and fine. £125 + free postage.
Tel: (01619) 501218 Email: jmbest2@sky.com

Asus p8h61-mle motherboard socket 1155. Original box 1/0 cover driver disk manual together with Celeron 91620 dual core CPU and 4 9195 pc1300 memory. Working fine. No fan. £70 + free postage.
Tel: (01619) 501218 Email: jmbest2@sky.com

Toshiba Satellite SA60 laptop. Model PSA60E-092058EN. Windows XP Home Edition with Certificate of Authenticity. For spares or repair - broken power connector on mobo. No power cord. Otherwise very good condition. £40.00 + p&p
Tel: Peter Scarth (01452) 372350 Email: pscarth@blueyonder.co.uk

SoundBlaster Audigy SE 7.1 soundcard for sale. Perfect working order. Selling due to not being needed any more. Just £12 plus postage.
Tel: Ian (01132) 629028 Email: ianmatthewuk@yahoo.co.uk

Toshiba C500D-B-11 laptop. Virtually new cost £279 will accept £150 O.N.O.
Tel: (01217) 535324

Apple Touch 32 GB iPod. Virtually new cost £199 will accept £100 O.N.O.
Tel: (01217) 535324

HP 4Gb memory Microserver with two hard disc drives. £110. One with Linux MINT. Other with Linux FreeNAS. This will also run Windows 7 and Windows Server or Home Server. (Win 8 I've not tried it) Two spare HD slots with appropriate caddies. Slot for your SATA DVD drive also, (or use external usb or DVD drive if needed. 4 usb sockets on front, 2 on rear. VGA, network, power sockets on rear. Supplied in original HP box with CD and leaflets etc. Collect from Harrogate, North Yorks, or posted via Hermes for £12 (or less if I can do it). Cash on inspection and collection. (Highlands and Islands might obviously cost more on delivery)
Tel: (01423) 872045 Email: it_central@ntlworld.com

400GB IDE drive 3.5 inch formatted ready for use. Only £20 plus £3 for p&p. I can load genuine XP Professional from Microsoft with genuine certificate of authenticity for an extra £10. Refurbished.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: dave.thomas96@aol.com

Amstrad PcW 9256 in good working condition with software. Offers.
Tel: John Adams (02088) 641202 Email: meeching@uwclub.net

CRUCIAL 8GB (4x2). PC3-10600 unbuff. CT25664BA1339A. (4X2) = £48.00. (2X2) = £25.00. Boxed kit of CORSAIR Vengeance 4GB (2X2) = £35.00. Prices include P&P.
Tel: Bob Williams (01507) 602914 Email: flipinek@hotmail.co.uk

EPSON PRINTERS T715 12 multipack F.O.C. to good home, just pay postage £2.50. (Tesco equivalent original cartridges £120 current special offer!) Perfect crisp printing etc.
Tel: Pete Dew: (07526) 988594

EPSON PRINTERS T481-T486 6 multipack F.O.C. to good home, just pay postage £2. Perfect crisp printing etc.
Tel: Pete Dew (07526) 988594

EPSON PRINTERS T711 6 multipack F.O.C., just pay postage £2. Perfect crisp printing etc. May have others F.O.C. if model older than 12 months.
Tel: Pete Dew (07526) 988594

Intel 3930K processor. Used, but not overlocked. No box or fan. £220 ono. Will ship to UK address.
Tel: Tim (01623) 624509 Email tim.stirland@btinternet.com.

Apple Mac G4 Tower. 400MHZ cpu, 640MB Ram, 2xHardDrive 40GB,20GB. DVD & ZIP Drive. OS X v10.3 Panther+OS9. NO KEYBOARD OR MOUSE. £25 ono Buyer collects
Tel: (07941) 254296 Email: jasonnd@hotmail.com

Wireless Motorised IP Surveillance Camera. White In Colour - Control from your mobile phone / tablet / pc when out of the home - ideal for home security , baby monitoring, has sound and remote recording etc Brand new in Box - £25 Price includes post and packing.
Email: oمندata@gmail.com

Blueberry I-MAC. Good condition, all in working order, £55.
Tel: (01386) 832758

Lexmark Printer Z601, still working and in good condition, £25.
Tel: (01386) 832758

Dell Inspiron 660 Intel i5 QUAD CORE with ACER 23 Inch LED monitor. AS NEW. Operating System: Windows 8.1. MPN:620MT. Memory (RAM): 4 GB. Hard Drive: 1 TB. Processor Type: Intel Core i5. Processor Speed: 3.0 GHz. Features: Graphics Card GT620 1GB. Acer LED monitor 23" HD. £520
Tel: Hitesh Rao (01163) 198895

PRINTER CARTRIDGES. Suitable for Epson printers range T711 - T714. Work perfectly. 50 pence each, plus postage (brand new unused sealed). Over a dozen available.
Tel: (07541) 222678 Email: petedew@gmx.co.uk

Panasonic KX-P7105 mono laser duplex printer. Some toner left. Up to Windows XP only - hence £25. Buyer collects from N2, East Finchley
Tel: (02083) 431527 Email: pnnikiel@gmail.com

INKJET CARTRIDGES suitable for Epson Printers T711 - T714 range, and T481 - T486 range. 79 pence each, plus postage. Work perfectly, good crisp printing quality.
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50 copies of Micro Mart magazine. Mainly 2013 through 2014. Pick up as heavy. Devon. Price £20,
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Powered PCI Express x1 To x16 Riser Card Extension via USB 3.0 + Power Cable Adaptor. Allows you to add an extra Pci-ExpressX16 slot to your Pc converting an existing x1 slot to x16. Useful for adding an Extra graphics card to create a Cross-fire triple configuration or for Bitcoin data mining up to 7 cards can be installed using these adaptors. Quality model - Brand new still boxed. £10. Price includes p&p.
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2 HP Laserjet 3100 printer-fax-copier-scanners. In good working order. £25 each.
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Lian Li PC-X2000 Computer Case. Supports mATX, ATX, eATX; hot swap SATA drives, six 3.5" & two 2.5" hot swap disc holders. Three 140mm intake plus two 80mm and one 140mm exhaust fans. £140.
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2tb Western Digital SATA drive. Model WD2002FYPS 64mb cache, fully refurbished by government acknowledged company. All data taken off (some drives are still under Western Digital warranty) ONLY £50 including P & P
Tel: Dave Thomas (01942) 706572 Email: davethomas96@aol.com

GEFORCE 1 GBYTE 24- PCI express PC card. HDMI DVI VGA PC video card. £10 plus p&p £4.50. 2 for sale. £10 each.
Tel: (01707) 339063 Email: awhishaw@aol.com

6 P314 PC bases for sale, £100. The lot all with XP must be collected.
Tel: (02380) 733312 Email: zen96403@zen.co.uk

Motherboard Bundle. 2.4Ghz AMD Athlon XP 32bit CPU 512MB Ram 5xpci 2IDE LAN sound good for gaming, office work, surfing the net, watching movies generally a good all round system spec can slightly be changed if required please email or call me for a price.
Tel: David (01616) 888119 Email: pcmadnessltd@yahoo.co.uk

4 gb (2 x 2gb) of OCZ Reaper PC2 6400 ddr2 memory. Fast gaming memory, used but in excellent condition, £49.95 inc postage.
Email: baslake@blueyonder.co.uk

500GB SATA drive. 3.5" formatted ready for use. Software can be installed for an extra charge. Windows 7 extra £35 includes disk and certificate of authenticity. Only £23 including P&P.
Tel: Dave Thomas (01942) 706572 Email: davethomas96@aol.com

Retro Commodore 64 with 1541 disktrive tapedeck. All in original boxes, mags. Pick up from Somerset. £75 ono.
Tel: (01278) 691606

6 P3/4 PC bases for sale. £100 the lot. All with XP. Must be collected.
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MAC BOOK PRO A1151. Spares and repairs 17" screen 2.16GHz intel CPU looks in good condition screen appears to work. Please email or call me for a price and more information.
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CISCO CONSOLE CABLES. I have a lot of Cisco console cables all new let me know how many you would like please email or call me for a price and more information.
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750GB SATA drive for sale. Perfect working order. Formatted ready to use. Only £25 plus £3 p&p. Genuine Windows XP with Certificate of Authenticity can be pre installed for an extra £10.
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Socket 775 System. Coolermaster Case, audio + USB. Asus P5KPL-AM EPU E6600 CPU. 250 GB Hdd. DVDRW, ATI 5450. Boxes, drivers. Samsung 19" Monitor HDMI USB. Keyboard mouse. Windows 7 Professional SP1. £100 collect from Louth, Lincolnshire.
Tel: (01507) 602914 Email: flipinek@hotmail.co.uk

2 x 2GB Samsung DDR3 pc3-8500 1066 SODIMM. 204 pin as new laptop memory. £15 inc postage to inland UK.
Email: jvital@mail2web.com

HP 5101 5102 5103 Netbooks and Notebooks. Lots of parts available down to the tiniest screw. Contact with requirements.
Tel: (01892) 833413 Email: fwfkent@gmail.com

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Tel: Dave Thomas (01942) 706572 Email: davethomas96@aol.com

Internal Card Reader. Compatible with most camera memory cards. Also has a USB port. Colour: black or silver. Please email or call me for a price.
Tel: David (01616) 888119 Email: pcmadnessltd@yahoo.co.uk

AGP, PCI and PCI-e graphics cards. Please email or call me for a price.
Tel: David (01616) 888119 Email: pcmadnessltd@yahoo.co.uk

Motherboard Bundle. 3Ghz AMD 64bit CPU 512MB Ram 5xpci 2xSATA 2IDE 1Gb LAN 6 channel sound firewire. Comes with driver CD and manual. Good for gaming, office work, surfing the net, watching movies, generally a good all round system. Spec can slightly be changed if required. Please email or call me for a price.
Tel: David (01616) 888119 Email: pcmadnessltd@yahoo.co.uk

PC gaming hardware. I have got 1 x force feedback steering wheel, 1 x force feedback joystick, 1 x normal joystick, lots of game pads. Please email or call me for a price.
Tel: David (01616) 888119 Email: pcmadnessltd@yahoo.co.uk

Vintage Apple Macintosh Classic II PC for sale. Complete with keyboard, mouse and microphone. Offers.
Tel: 07733 628986 Email 576924@tiscali.co.uk

Brand new USB brackets. Add 2 extra USB2 ports to your computer at little cost. Very simple to fit cable connects onto the motherboard and uses a spare slot on the back of your computer. No drivers required. Please email or call me for a price.
Tel: David (01616) 888119 Email: pcmadnessltd@yahoo.co.uk

Internal 3 1/4 floppy drives. Choice of white/black/silver/no face plate. Please email or call me for a price.
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Brand new Laptop bag. Still sealed in the plastic bag and never used (it came as part of a bundle). Please email or call me for a price.
Tel: David (01616) 888119 Email: pcmadnessltd@yahoo.co.uk

Brand new flatbed scanner. Still boxed and never used (it came as part of a bundle) Please email or call me for a price.
Tel: David (01616) 888119 Email: pcmadnessltd@yahoo.co.uk

Desktop cases. AT and ATX types and tower and flatbed form factor different sizes and colours can be posted or picked up from Manchester please email or call me with your requirements.
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Laptop RAM. 2x1GB PC3-8500 DDR3 1067MHz pulled from a working mac book pro but can be used in other laptops this is the quickest way to boost your laptop's speed. Please email or call me for a price.
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160GB 3 1/2 inch desktop Hard drive IDE. Clean pull (little to no use) no bad sectors tested all you need to do is plug in and go. £20 +p&p
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Asus Transformer Prime TF201 Tablet PC. NVIDIA Tegra3, 32GB Flash, 1GB RAM, 10.1" LED, Wifi, Bluetooth, 2 x Webcam, Champagne Gold, Android 4.2, with keyboard dock. £150.00.
Tel: Rob Pratt (01189) 781753 Email: robpratt@bizitsolutions.co.uk

Computer Monitor. HP s2231a. 1080p, 22 inch display, 1920x1080 resolution. 60 Hz, contrast 15,000:1. Price £40 ONO
Tel: Matthew Taylor (01842 813630) Email: chackpobly12@hushmail.com

Two Apple G4 iBook Laptops. 12" screen, 800 MGHZ CPU 640MB RAM. OSX (Tiger) 30GB HDD batteries ok M/Chargers, nice machines. £105 each or £200 for the two.
Tel: Matthew Taylor (01842 813630) Email: chackpobly12@hushmail.com

Gaming PC HAF-X case. ASUS P6X58D-E, i7 930 4GHZ 6GB Corsair i7 mem, gigabyte gtx470, Asetek CPU LCLC 240mm radiator + watercooling. Two 12cm fans, PSU needs replacing. DVDRW, networking, original software, extra cabling. (Price: £400 ONO).
Tel: Matthew Taylor (01842 813630) Email: chackpobly12@hushmail.com

SATA Drive Tray For Laptops. Allows you to remove your CD/DVD Optical Drive and Insert a second Hard drive. Very useful for backups, file recovery and RAID setup on a laptop. Brand new, still sealed and boxed. £10 including P&P.
Tel: Gary Gemmell (01415) 712822 or (07551) 293083 Email: omendata@gmail.com

Gold Northbridge Heatsink. £3 including P&P.
Tel: Gary Gemmell (01415) 712822 or (07551) 293083 Email: omendata@gmail.com

Rugged Magnesium Alloy cased HP 5101 Business Netbook. 120Gb HDD 2Gb Ram, running Linux Mint 16. Excellent for Uni, Holiday or just as a spare machine. Complete except for PSU. £60 plus £8 P&P
Tel: Fred Lemont (01892) 833413 Email: fwjKent@gmail.com

Midi tower PC. Windows XP, Office XP, 230GB HDD, FDD, 2x DVD drives, HP Photosmart printer & Canon scanner. All relevant discs. £50.00.
Tel: Alan Phillips (01745) 354614. Email: alan.phillips747@talktalk.net

Two Apple G4 iBook Laptops. 12" screen, 800 MGHZ CPU 640MB RAM. OSX (Tiger) 30GB HDD batteries ok M/Chargers, nice machines. £105 each or £200 for the two.
Email: micksharp@live.co.uk

XFX Radeon HD 6870. 1GB GDDR5. Original packaging, never overlocked..£75 plus £6.95 pp.
Tel: Simon Hardwicke (01536) 724334 Email: simon.hardwicke1@ntlworld.com

Asus Sabertooth 990FX Mobo. £100 plus £6.95pp (with Phenom II 980 add £50).
Tel: Simon Hardwicke (01536) 724334 Email: simon.hardwicke1@ntlworld.com

Lian Li PC-X2000 Computer Case. Supports MATX, ATX, eATX; hot swap SATA drive compartment. Includes six 3.5" & two 2.5" hot swap disc holders. Three 140mm intake plus two 80mm and one 140mm exhaust fans.
Tel: Ian (01932) 856971 Email: a2345@btinternet.com

Matricom G Box Midnight MX2 Android HTPC. New boxed. £85 ono. Postage £3.
Tel: Mick Young (02072) 321695 Email: mick.young@o2.co.uk

Funai D50M-100Y VCR recorder, 6 head A2 stereo. New boxed. £90 ono. Postage £4.
Tel: Mick Young (02072) 321695 Email: mick.young@o2.co.uk

Cartridges for a Xerox 8500/8550 Phaser Colour Laser Printer. 6 Black, 5 Cyan, 4 Magenta, 2 Yellow solid block cartridges going very cheap! Check out cost new from Choice Stationary and make me an offer. My Xerox has given up the ghost after several years.
Tel: Ken Driver (01890) 820295 Email: ken@stonehaven2.plus.com

Gaming PC. HAF-X case ASUS P6X58D-E, i7 930 4GHZ, 6GB Corsair i7 mem, gigabyte gtx470, Asetek CPU LCLC 240mm radiator + watercooling. two 12cm fans, PSU needs replacing. DVDRW, networking, original software, extra cabling. £390 ONO
Tel: Alex Thomas (01842)813630 Email: chackpobly12@hushmail.com

Custom PC. AMD FX-4100, 8Gb Ram, 500Gb HD, DVD Writer, AMD HD-6750 GPU, Keyboard & Mouse, 19 inch LCD Monitor, Genuine Windows 7 Pro, £250 + delivery.
Tel: Mike Whittington (07533) 270020 Email: mike.whittington@blueyonder.co.uk

Intel 3930K processor. Used, but not overlocked. No box or fan. £220 ono. Will ship to UK address.
Tel: Tim (01623) 624509 Email: tim.stirland@btinternet.com.

Apple Mac G4 Tower. 400MHZ cpu, 640MB Ram, 2xHardDrive 40GB,20GB. DVD & ZIP Drive. OS X v10.3 Panther+OS9. NO KEYBOARD OR MOUSE. £25 ono Buyer collects
Tel: (07941) 254296 Email: jasonnd@hotmail.com

Wireless Motorised IP Surveillance Camera. White In Colour - Control from your mobile phone / tablet / pc when out of the home - ideal for home security , baby monitoring, has sound and remote recording etc Brand new in Box - £25 Price includes post and packing.
Email: omendata@gmail.com

Blueberry I-MAC. Good condition, all in working order, £55.
Tel: (01386) 832758

Lexmark Printer Z601, still working and in good condition, £25.
Tel: (01386) 832758

Dell Inspiron 660 Intel i5 QUAD CORE with ACER 23 Inch LED monitor. AS NEW. Operating System: Windows 8.1. MPN:620MT. Memory (RAM): 4 GB. Hard Drive: 1 TB. Processor Type: Intel Core i5. Primary Drive: Optical DVD+/-RW, Processor Speed: 3.0 GHz, Features: Graphics Card GT620 1GB. Acer LED monitor 23" HD. £520
Tel: Hitesh Rao (01163) 198895

PRINTER CARTRIDGES. Suitable for Epson printers range T711 - T714. Work perfectly. 50 pence each, plus postage (brand new unused sealed). Over a dozen available.
Tel: (07541) 222678 Email: petedew@gmx.co.uk

Panasonic KX-P7105 mono laser duplex printer. Some toner left. Up to Windows XP only - hence £25. Buyer collects from N2, East Finchley
Tel: (02083) 431527 Email: pnnikiel@gmail.com XFX HD 7950 GPU. I have 2 for sale, both have 6 months guarantee, willing to split, £180 for pair or £100 each + delivery.
Tel: Mike Whittington (07533) 270020 Email: mike.whittington@blueyonder.co.uk

Nvidia GeForce 9500GT Super+ 1GB DDR2 Video Card (Palit). Unboxed. Great Condition. Not Been Overclocked. £30 Inc P&P
Tel: Steven Seward (01354) 656578 Email: steven_seward@sky.com

16GB Corsair Vengeance DDR3 RAM (2 X 8GB). £120 ONO. Brand new and unopened
Tel: Chris Paul (07827) 447779 Email: cmpaul25@gmail.com

New Cooler Master HAF X USB 3.0 XL ATX Case. No PSU. Reason for sale it will not fit in my computer station. Buyer collect only. £80.
Email: paul_999@sky.com

Two laptop hard drives for sale. 1- HITACHI 250GB - SATA3 - 5400rpm. Sell for £25. 2- WD SCORPIO BLACK - 250GB - SATA3 - 7200rpm. Sell for £30. Paypal only please.
Tel: Wolfgang Dahm (07590) 440475

Intel Core 2 Duo T5600 Dual Core Laptop CPU. Removed from working Dell D630 Latitude laptop due to Gfx chip failure, Now no longer needed. Tested and fully working using CPU Burnin test. £15. Price includes P&P.
Tel: Carole Walker (07551) 293083 Email: omendata@gmail.com

Mini-Usb Finger Optical Laser Mouse. Attaches to your finger and has two side buttons. Great replacement for standard mouse. Ideal for disabled users or for use where a normal mouse would not work. £10 p&p included.
Tel: Carole Walker (07551) 293083 Email: omendata@gmail.com

HARDWARE WANTED

Trying to breathe life back into an old machine? Why not submit a wanted ad to MicroMartClassifiedAdverts@gmail.com and see if any of the thousands of computer enthusiasts who read the magazine each week have what you're looking for?

WANTED: Working Dot Matrix Printer in Good Condition. Thanks!
Email printer.20.oday@spamgourmet.com

WANTED: Acorn computer either an A5000 or A7000. Also book on teaching yourself binary.
Tel: (07817) 861011
Email: Johnhaviland73@gmail.com

WANTED: Corsair PSU cable bag. Please email me if you can.
Email: Paul@planetvoodoo.co.uk

Wanted: HD 3850 Graphics card, must be AGP.
Tel: (07817) 861011

Wanted: Fully working mainboard for AMD socket AM2+/AM3, micro ATX size. Must use DDR2 RAM.
Tel: Brian Taylor (07570) 452557
Email: bmorgant@yahoo.co.uk

Wanted: Factory system restore disc for a Dell Inspiron 1750.
Tel: Darren Day (07707) 556193
Email: ddshaggy@btinternet.com

SOFTWARE FOR SALE

Norton Family Premier 2.0. Runs under Windows 8, 7, Vista or XP, Original Symantec unused product key £15.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Microsoft Office 97 Professional. Original disc with key £18 inc postage.
Tel: Andrew (01376) 512118

Windows XP Professional. New and sealed. Book, software and license (certificate of authenticity) 100% genuine and unopened. (Dell branded but will install on any machine) ONLY £15 including P&P.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

Microsoft Office Small Business Edition 2003 with Business Contacts. Legitimate Office Small Office Business Edition comprising Word, Excel, Powerpoint, etc. Comes with small piece of OEM hardware and original license code (coa) £10 incl. delivery, cheque or PO. £10.50 by Paypal.
Tel: (07794) 528857
Email: it_central@ntlworld.com

Norton Utilities 16 for 3 PCs. Runs under Windows 8, 7, Vista or XP, Original Symantec CD with unused product key £12.50
Tel: Ian (01932) 856971

Email: a2345@btinternet.com
Dell Windows XP Pro SP2 Reinstall Original Cd. Allows You To Restore Your Dell PC / Laptop Without A Licence Key. Brand New Still Packed. £10. Price includes p&p.
Email: omendata@gmail.com
HP Windows XP Pro SP2 Re-Install Cd. Allows You To Restore Your HP PC / Laptop Without A Licence Key. Brand New Still Packed. £10. Price includes p&p.
Email: omendata@gmail.com

HP Windows 7 Pro Sp1 Re-Install Dvd. Allows You To Restore Your HP PC / Laptop Without A Licence Key. Brand New Still Packed. £10. Price includes p&p.
Email: omendata@gmail.com

HP Windows 8 Pro Re-Install Dvd. Allows You To Restore Your HP PC / Laptop Without A Licence Key. Brand New Still Packed. £10. Price includes p&p.
Email: omendata@gmail.com

HP Windows 8.1 Pro Recovery Dvd X 2. Allows You To Restore Your HP PC / Laptop Without A Licence Key. Brand New Still Packed. £15. Price includes p&p.
Email: omendata@gmail.com

Windows 7 ULTIMATE 32 bit version. NEW software and license (certificate of authenticity) 100% genuine and unopened software .ONLY £45 including P & P.
Tel: Dave Thomas (07828) 982930 or (01942) 706571
Email: davethomas96@aol.com

Windows Small Business Server 2003 Premium Edition. 7 Disc Set. £30.
Email: omendata@gmail.com

Windows Server 2003 R3. 2 Disc Set. £20.
Email: omendata@gmail.com

Windows Vista 32bit for sale. Genuine item with genuine product key. £35 including P&P.
Tel: Ian (01132) 629028
Email: ianmatthewuk@yahoo.co.uk

Windows 7 Professional. I have both 32 and 64 bit versions. NEW software and license (certificate of authenticity) 100% genuine and

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Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Windows 7 Home Premium NOT BRANDED 32 and 64 bit versions. NEW software and license (certificate of authenticity) 100% genuine and unopened software. ONLY £35 including P & P.
Tel: Dave Thomas (07828) 982930 or (01942) 706571 Email: davethomas96@aol.com

Office 2007 Pro Plus for sale. Includes Word, Excel, PowerPoint, Excel, Publisher and Outlook. Disk only with serial number. £40 including postage.
Email: ianmatthewuk@yahoo.co.uk

SOFTWARE WANTED

Wanted: Windows 98 CD ROM operating system with boot disk instruction manual and serial number.
Tel: Craig (07867) 930265 or 01912093677 Email: craigtin44@hotmail.com

Wanted: LG GSA 2164 D software disc to replace broken original.
Tel: Glen Fremantle (01387) 248976 Email: bldamsys@yahoo.co.uk

IMPORTANT BUYING ADVICE

We work very hard to police our classified ads, and make them as secure as possible. However, please do your bit too and use the following guidelines:

- **Never - NEVER** - pay by bank transfer or post out cash, unless you know the trader already, or are sure it is okay to do so. Pay by cheque, Paypal, Nochex etc wherever possible.
- Be wary of anyone who insists on you paying by the above methods if in doubt, get us to check them out by mailing editorial@micromart.co.uk
- Keep copies of all correspondence
- When sending out goods, at the least obtain a certificate of posting from the Post Office

If in any doubt, feel free to mail us at editorial@micromart.co.uk. Every year, thousands of successful transactions take place through our classifieds, and that's just how we like it. Help us help you keep them one of the safest and most secure places to buy and sell computer kit.

ASK AARON



Meet Aaron Birch. He's here to help you with any general upgrading, software and system building issues. He's got advice aplenty, and you're very much welcome to it!

Send your questions to:
Aaron Birch
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Aaron by email at:
aaron@micromart.co.uk

Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

Blank BIOS

On switching on my computer, I do not get a motherboard startup screen. The monitor stays in sleep mode (as though there is no output from the computer) until the hard drive powers up and the operating system (Mint 16 KDE) then starts as usual and the computer works normally. I was trying to upgrade from a DVD, but the computer will not boot from that, although I always have my computers set to boot from CD-ROM, hence I wanted to check the BIOS.

Motherboard is a Gigabyte GA-F2A88XM-DS2 and hard drive is an SSD. I have cleared the CMOS, but to no avail.

It must have worked normally when the system was installed but I cannot think what may be wrong. Your advice will be much appreciated.

Paul

From your description of the problem, I suspect the problem is not with the motherboard as such, but is with the feed from the motherboard to the monitor. As the PC boots to your OS, the system is obviously fine, so we need to focus on the monitor, and the graphics card and/or onboard video.

First, check what video output you're using from the motherboard. If you're using DVI, try switching to VGA. Occasionally, some BIOS problems can arise from other types of input, and VGA seems the most reliable in these situations. This may instantly solve your problem, and allow you access to the BIOS.

If you have another monitor, give this a go too, just to see if your current display has any problems. Trying different cables is also a good idea, as faulty cables have been known to cause problems, even if they work once the OS has booted.

If you're not using the onboard video of the motherboard and also have a video card fitted, try switching the video cable to onboard. Also try removing the video card, so the PC defaults to onboard graphics. If there are any problems with the video card, this should bypass them and allow you access to the BIOS again.

If the problem appears to be with the video card, it may not be because the card itself is faulty; you may simply need to update your BIOS to properly support it, so be sure to visit Gigabyte's website and check for any relevant updates.

▼ Sometimes you may need to update a BIOS so it can use graphics cards correctly



Old Windows, New Bits

I hope that you will be able to help with a major problem. My main system died recently, due to a faulty PSU, which took out all the major hardware, including the motherboard, CPU, memory, and HDD.

This machine had a front loading SATA caddy fitted so that I could switch between Windows 7 and Linux Mint simply by swapping the drive over. The drive in the machine at the time of the disaster was my Linux installation. I'm not too worried about losing that, as I can re-install to a new drive easily, but I need to get my Windows 7 installation going again. I have been living in it for years now, and have got it just how I like it, and since it was not damaged, I bought all the parts to rebuild my system, but unfortunately could not get the same motherboard or CPU as they are obsolete.

My original set up had a Gigabyte GA-Z77-D3H motherboard fitted with an Intel I5-3470 3.2 GHz CPU. I managed to get a Gigabyte GA-Z77H-D3H motherboard, and Intel I5-3570 3.4GHz CPU.

I hoped that merely inserting my W7 disk, the machine would start up and run as before, but no luck. Instead I get a BSD, and auto repair won't function. I know it's possible to sysprep an installation ready to swap to new hardware, but the old hardware is no longer available to be able to do this. I can access all the files on this drive, so is there something I can do to it to get it to recognise this ever so slightly different hardware configuration.

I have the original installation media, and do know that I could do an install from scratch, but getting it back how I like it could take weeks.

Joe



▼ If you have problems with Windows after upgrading your motherboard, you may have no choice but to reinstall Windows

Upgrading core components in machines with Windows installed can often be problematic, and changing hardware is one of the easiest ways to bring a blue screen of death into your life. The problem usually occurs because the new hardware conflicts with the drivers currently installed in Windows, and in many cases, the best way to solve it is a new setup, spearheaded by backing up all of your data. This full reinstall will solve your problem, but I understand your wish to avoid this, so let's look at how you can possibly get around it.

First, I'd give the Windows repair install a go. I'm not sure if this is what you meant by the auto repair (I assume this is the boot-up repair screen), but just in case you haven't tried it, boot up your PC with the Windows 7 disc in the drive, and from the boot menu, use the Windows repair install. This will reinstall Windows, refreshing the drivers, hopefully ones you actually need, and once done you may be all set. Your programs and files should remain intact. However, I'd still backup your data beforehand first, just in case. If you've tried this already, Safe Mode may be your answer.

Try booting up into Safe Mode by tapping F8 as you boot up, then select the Safe Mode with networking option. If you can get here, you'll be able to use Safe Mode to uninstall the motherboard drivers, and install ones for your new model, which you'll need to grab off the install disc you got with the board, or via the website. Once these drivers are installed, try rebooting and see if Windows runs normally. If it does, you should be okay.

Be aware, however, that bodging a install like this can often cause additional problems, so you may need to be extra careful, and save your data to another drive.

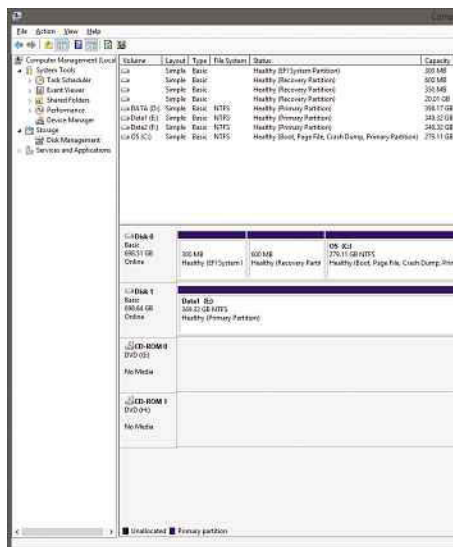
Capacity Query

This may be a real dumb question, but I have what seems – at least to me – a curious problem.

I am running Windows 7 Professional, with a 500GB SSD. In Computer, it says of Drive C has 79.3GB free of 447GB. This worried me, so I highlighted everything in the C: Drive, and checked Properties. This said that the total was 148GB. Subtracted from 447GB, that gives what should be a total of 299GB free, not 80. Oh, and I have emptied the Recycle Bin, which only had a few hundred MB in it anyway. Where are my missing 219GB?

I hope the attached images make the problem clearer. Any advice you could offer would be very helpful.

James



There could be a number of reasons for the apparent missing space on your drive, James. The first, most likely, scenario however is that there are simply hidden files and folders that you can't see.

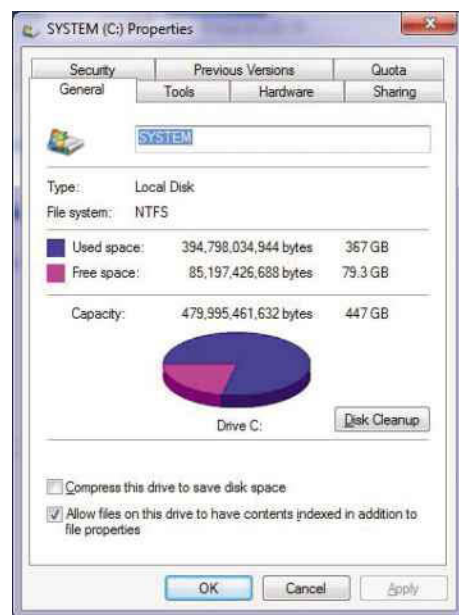
As these are hidden, they won't be selected when you try to measure their size in the manner you have with the rest. These hidden files include system files and folders, as well as restore points and the swap file, so it's certainly feasible that this is where your missing space is. To check this, go into Folder Options and ensure the options to hide hidden and system files are not checked, then try again.

As your screen grabs showed the majority of the drive space is available to C, I doubt there are any hidden partitions for recovery causing the problem, but be aware that your SSD may be using some space for provisioning. In fact, the total drive capacity is listed as 447GB, so the system has already used a portion of that space, even before you took up any space with your own data.

If any other readers are looking to find out more about their drives, and to see partition information, try right-clicking My Computer and selecting Manage. Click Disk Management and you'll see exactly what's going on with your drives, including any partitions.

▼▼ Disk Management can help you see what's going on with your drive space

▼ Hidden files and folders won't show up if you simply select and right-click all folders on your drive



ASK JASON



Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
Jason D'Allison
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

Toy Story

My young son enjoys playing a very old game called Bad Toys 3D. It's like a cartoon version of Wolfenstein 3D. Sadly, though, it won't work on our new PC. This runs Windows 8.1 (64-bit), while our previous PC ran Windows XP (32-bit). Even the compatibility mode doesn't help. I'm thinking the answer is to set up a hypervisor – I'm familiar with VirtualBox – and run XP as a VM (virtual machine). Of course, to stay legit, I'd still need an XP licence. What's the best way to pick one up these days? I don't want to spend a fortune.

John, Gmail

You don't need to spend a penny (or visit the loo). Believe it or believe it not, Microsoft provides pre-built Windows VMs for free. That's right – gratis. At no cost. Without charge. On the house. XP, Vista, 7, 8.x, the preview of 10 – they're all available, for all the major hypervisors. Point your browser at bit.do/YPv7 and fill your boots (or boot

drive). For Bad Toys 3D, your best bet is clearly Windows XP. Really, these VMs are aimed at developers who want to test website compatibility across different versions of Internet Explorer, but don't worry about that.

Each of the VirtualBox VMs comes as an .ova file – an Open Virtual Appliance. Launch VirtualBox, click File, click Import Appliance, hit the browse icon, locate your download, click Next, then click Import. And that's it. From there, John, just use VirtualBox as normal. Happy days.

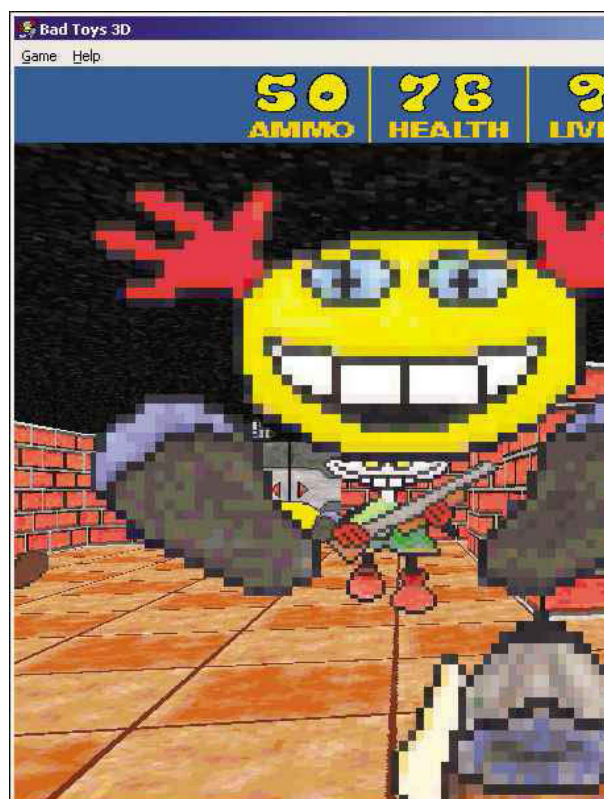
The XP and Vista VMs don't need activating and expire after thirty days, while the later VMs do need activating and expire after ninety days (product keys aren't required). Getting over the expiration hurdle is a doddle, of course – just make a new VM with your original .ova file and start again. Alternatively, get your VM set up how you want, take a snapshot, and back that snapshot up. Whenever the VM

expires, just load the backup and, once more, start again. These workarounds might sound pretty dodgy, but they're actually endorsed by Microsoft itself.

PS – Bad Toys 3D is a retro blast. I don't know why, but it always draws me back every couple of years. It's approaching twenty years old and looks it, but the Czech developer still has it up for sale, priced \$9.95 (£6.62 at the time of writing) – see bit.do/YQWH. The free trial contains the first three of 25 levels. I urge all readers with children – heck, just all readers – to hit the download button.

▼ **Pre-built Windows VMs for free? With Microsoft's blessing? Never in this world!**

▼▼ **It doesn't get much better than this!**



Dirty Secret?

I recently replaced the screen on my iPhone 4s (the whole assembly, including the LCD panel, cost about £15!). However, I've noticed it attracts grease and smudges like nothing on earth, and it's not easy to clean. Is this normal? Maybe the original screen was the same. I wouldn't really know, as I'd only owned the phone a week (it was second-hand) before dropping it and smashing it! knows?

D. Granger, Gmail

The screen on the iPhone 4s has an oleophobic coating. This repels the oils secreted from fingers, meaning the screen doesn't get greased up so easily and can be cleaned with just a swipe with a cloth. It sounds like a marketing gimmick, but it's surprisingly effective. Most non-budget phones have such a coating, and typically this is also hydrophobic – it repels water.

As you've found, though, most cheap screen replacements are just that – cheap. To that end, oleophobic coatings are given the push. As they say – you don't know what you've got till it's gone.

Most cheap screen replacements are also plastic, whereas most original screens are glass. Perversely, at least in the case of the iPhone 4s, this can make them less prone to smashing when dropped, but it also means they lack scratch-resistance. Most non-budget phones, including the 4s, use aluminosilicate glass – Gorilla Glass, Dragontrail glass, or some alternative.

Again, this makes a big difference. I've owned my Galaxy Note II for well over two years and have never used a case or a screen protector, and only now is the screen beginning to show a few surface scratches. I can thank the Gorilla Glass 2 for that (we're now at Gorilla Glass 4).

But don't get disheartened, my friend! All the rage now are screen protectors made

from tempered glass. These are miles better than the bubbletastic plastic stickers of old. And many have oleophobic coatings. Quality varies wildly, but a £2.99 job from a reliable eBay seller should be well worth a punt.

▼ **What's oleophobia when it's at home?**



Card Shop

I'm compiling a list of components for a new gaming build. I'll probably be using a micro-ATX motherboard and keeping the system fairly compact, chiefly so it can sit under the TV. With that in mind, I'm hoping to keep things near-silent. What's the best fanless graphics card available? I'm not after a water-cooled card or one with twin GPUs, and I don't want to fool about with after-market heatsinks. Could you point me towards a card that'll just plug in and kick butt?

Sam Halford, Essex

The fastest single-GPU graphics card without a fan (or fanclub?) is Palit's 2GB GeForce GTX 750 Ti KalmX (model NE5X75T00941-1073H).^{*} It's priced at around £120, but is it any good? Well, 7-series cards are a generation behind the curve, with the 9-series models being Nvidia's latest (the 8-series jobs are laptop-only). No big deal. However, a rough-and-ready way to gauge a card's performance – when you can't be bothered to trawl through benchmarks – is to compare its shader and GFLOPS numbers with those of the flagship single-GPU card in the same series.

Here, Sam, the flagship is the GTX Titan Black: 2,880 shaders and 5,121 GFLOPS. And then there's the GTX 750 Ti: 640 shaders and 1,306 GFLOPS. Hmm. It's got only 20% to 25% of the chops. In truth, it's better than that, but even so, to run current

games 'properly' – at a solid 25fps or higher, at 1080p or higher, and at medium detail or higher – look at the series flagship and, in terms of shaders and GFLOPS, buy a card at least half as powerful. That's another quick-and-dirty guide.

Now, the GeForce GTX Titan Black costs about £775. Extraordinary – and I mean not only the cost but also the level of insanity you'd need to reach in order to pay it. It's just a slightly souped-up GTX 780 Ti, a card that costs about £325. But still, would the GTX 750 Ti meet your needs? At a pinch, I guess. But I think you'd be setting yourself up for months of denial – trying to convince yourself you'd not made the wrong decision. That 2GB of RAM is miserly, too.

*Let's be positive, though. The thing with a fanless graphics card is that it still needs cooling. Unless there's a current of cool air washing over the heatsink, it'll overheat. A case fan – maybe even an *extra* case*

fan – is essential, and probably a bigger or faster one – a noisier one – than if a regular card were fitted. In short, a fanless card, unless it's low-end (and if it is, why aren't integrated graphics being used?), doesn't really grant silence. For a high-end gaming rig, Sam, I fear you'll just have to accept a certain level of noise.

^{*} For the record, the fastest single-GPU card from AMD is Sapphire's 1GB Radeon R7 250 Ultimate (model 11215-04-40G). That's about £80. Sapphire also offers the 1GB Radeon HD 7750 Ultimate (model 11202-03-40G). It's an oldie, but it's actually probably faster, a factor reflected in its £95 price-tag. However, Palit's GeForce GTX 750 Ti KalmX knocks both into a cocked hat.

▼ **Is it possible to buy a passive graphics card with enough chops for high-end gaming?**



Crowdfunding Corner

This week, we're crossing the fence from Kickstarter to IndieGoGo for a look at some of the technology projects featured on the crowdfunding site that represents the Linux to Kickstarter's Windows

Flicks: Mobile Party Boombox Projector

The Flicks is an all-in one 'party boombox', and if it makes it easier to understand, you can imagine as a fusion between a video projector and a pair of Bluetooth speakers. This fully portable, rechargeable device incorporates an ultra-bright LED projector, so you can get movies and video playing on any surface even when you're miles away from the nearest plug socket.

What really sells this device, though, is its connectivity. It supports Roku streaming devices and ChromeCast to allow you to watch any video. A built-in USB charger allows you to juice up your phone or tablet. The airtight case includes dual speakers and subwoofer, and the case itself incorporates a carry handle. There's also an HDMI port, USB-out and a microphone, so it can be used as a speakerphone. If all that sounds a little heavy duty for a rechargeable, don't worry – a full charge can project movies for eight hours and play music for 56 hours.

As you'd expect, none of this comes cheap. The Flicks early bird price is \$449 with \$40 shipping (£325 total) and the regular price is \$50 on top of that for a total of almost £360. The project is almost halfway to its \$50,000 goal with a month to go, so there's a good chance you'll see it happening soon.

URL: bit.ly/16hi6Ft

Funding Ends: Thursday, 5th March 2015

Blaser: A Laser Keyboard and Mouse

The idea of a laser-projected keyboard sounds insane, but the Blaser does use existing virtual-keyboard technologies that are available already – it just combines them with a laser for a shinier, more futuristic appearance.

The Blaser itself is a 60g device, which connects to any number of systems using Bluetooth. Once connected, it'll project a keyboard, which you can type on simply by striking the place the keys are being projected. The detection algorithms will 'read' your keypress based on how your fingers interact with the projection, and that's then converted into a keystroke. The upshot is that you can tape or use a mouse on any surface that the Blaser can be projected onto.

The device supports iOS and Android as well as Windows and other operating systems, and an LED screen shows what you're typing and gives information about the connectivity and battery state.

The only problem is that the campaign is kind of badly written, which probably explains its low uptake. It's clearly the product of machine translation, but it's understandable that this would make the campaign seem riskier. At time of writing, it has 57 days to reach a \$100,000 target, which seems unlikely. Still, stranger things have happened. You can back the project for a black or white Blaser by paying \$115 plus \$5 shipping, which works out at about £80. Is it worth the risk? That depends on how much you want to believe it is.

URL: bit.ly/1LAAadP

Funding Ends: Monday, 30th March 2015



Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

Nenx

Buy! Buy! No, sell! Sell! David Hayward gets his stocks in order

Here's an interesting app for those of you who fancy taking a punt at stocks and shares. The idea of dabbling in the markets isn't a new one, but since its entry into the limelight of modern times, with city bankers and wheelers and dealers earning hundreds of thousands in bonuses, the 'average' person is now considering their portfolio and keeping an ever watchful eye on the rise and fall of the international markets.

The Wolf of Wall Street is the latest film to touch on the rise of the stockbroker's amassed wealth, and it has a lot of people thinking: surely I can do that too?

As it happens, you can, to a degree at least.

Trading Places

Nenx allows over 18s (it is gambling, remember) to create an account and credit with money. Once the account has a minimum of £1, you can begin to view the current markets to get an idea of what's going on.

This is where things begin to get a little interesting. While traditional gambling apps, namely those that deal with casino type games, are purely based almost solely on luck, playing the markets in Nenx requires a more educational approach.

You can start by viewing a timeline graph of the current market or commodity, where

you'll see its rise and fall as the global demand and various exchanges dictate its value. For example, the current oil prices may seem like they randomly go up and down, but on closer inspection you begin to notice a trend, where it'll rise and affect the value of the dollar against the pound and vice versa.

With this information, you can then place your bet. It's a very simple affair, really, as all you're betting on is whether you'll think the current value will rise or fall over a certain period of time.

You can bet then, say £5, on whether the pound will rise against the dollar within the next 30 seconds. If it does, then you win and you'll receive a percentage more on top of the original bet as per dictated by the Nenx team. As an example, a £5 win on that particular scenario with a 70% bonus will net you a tidy £8.50. And as you would expect, the more you bet, the more you'll win.

Naturally, though, there's also a pretty good chance you'll lose, and this where the gambling side of things is monitored by the UK Gambling Commission. What's more, you can also limit the amount you can lose in the course of the time you'll spend on Nenx, so you won't get too carried away and end up with all manner of problems.

For more information, visit the Nenx page at www.nenx.com.

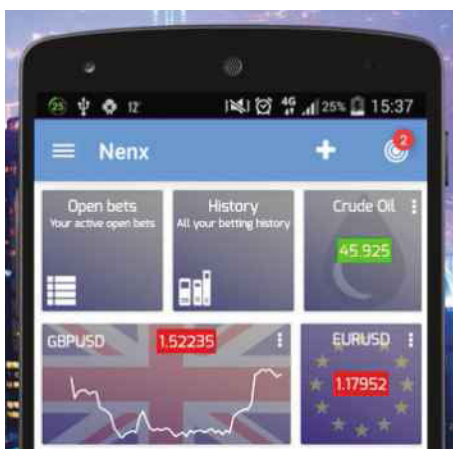
Conclusion

Nenx is certainly a very addictive and interesting gambling pastime, but it's still gambling. So while Nenx issues warning relating to the gambling side, we must mention it too. In short, you're all adults, but do be careful when taking part in any kind of gambling.

Having said that, though, we had great fun with Nenx. We lost a fair few pounds, and then we gained it all back again. We doubt we'll ever manage the £250,000 bonus and weekly wage, but then we're not living the stressful life that comes with that either.

Features At A Glance

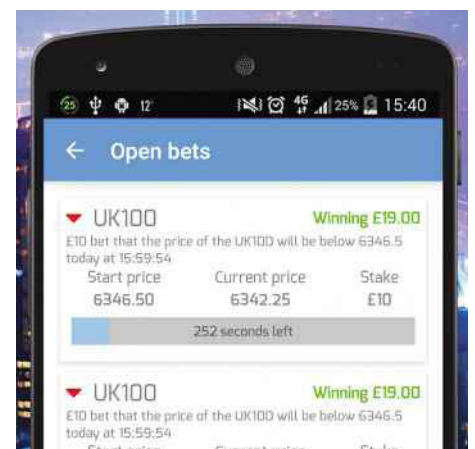
- Protected, licensed and monitored by the UK Gambling Commission, Gambleaware, Gamecare Certified and Problem Gambling Support.
- Full self exclude for six months to five years.
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- Interesting and more fun than a casino app.



▲ You can analyse the markets, then bet on their rise or fall



▲ If you've kept your head, then you can make some money, otherwise you'll lose your bet



▲ All being well, you'll have a few winners and enjoy the fruits of your success

Logging Off

This week, I wish to share with you a momentous occasion in my writing career, for want of a better expression to describe what I do.

After no less than nine years in the making, I've finally moved out of my bedroom (yes, seriously) and into a new and spacious office. This project started in earnest started back in 2005, when I realised that my home contained a perfect working environment that was unfortunately being utilised as what is laughingly called a garage.

While it had the external door and general shape of a garage, it never really met that definition in any other respect. We once tried to put our Ford Mondeo in there, and though it was possible, to exit from the vehicle involved climbing over the seats and out through the tailgate. My house was only built in the 80s, so I can only assume that the builders assumed the Smart Car would take over the world.

This space had morphed into a general junk zone and my wood lab, where in the summer months I'd operate vicious power tools with the purpose of turning useful wood into something moderately less useful.

What was less apparent was that what I'd created unwittingly was a huge set of achievement dominos, where to get the final one to topple I'd need to place a dozen others precisely. Therefore, to get out of the bedroom, I'd need to convert the garage, and to do that it needed to be empty and so on.

Initially, I built a structure in the garden that I had the full intention of mounting a shed on, but for numerous reasons it never happened. In fact, by the time I was ready to put a shed there, it had disintegrated, and I was forced to build another in precisely the same place.

After I'd built a base, I put a big shed on it, moved all the junk out of the garage and then had that converted. Easy to write, hard to do. Where I was happy to build a shed base and even assemble a shed on that, raising the floor and installing the window/wall in the garage was something I was happier for someone else to attempt.

The results of all this, despite the incredible effort needed to make it happen, has exceeded my wildest imaginings. I now have a wonderful working space, where all my technology can happily live, and my wife's adoration for vacating the bedroom is practically boundless. It's so good that very quickly I'm erasing the cost, blood sweat and tears that it took to get here, and the nine long years of painful gestation.

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That doesn't mean there isn't a downside, however,

because now unleashed from this project, I'm already being prepped for other works in and around the house, unsurprisingly. But for a brief moment I'm basking in the glow of 'mission accomplished' status and enjoying working in a more professional environment. However, I've already made it clear that I won't be wearing a shirt and tie to the 'Goffice' (garage-office) or implementing any strict health and safety guidelines.

No, I'll be doing pretty much what I was doing elsewhere, dressed the same, but with more space and light to work. It's a small victory in a long and largely fruitless war, but I'll take that imposter and parade him all the same.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: 7 Vicious Circle, 8 Mexico, 9 Regice, 10 Igneous, 12 Globe, 14 Taper, 16 Context, 19 PCMCIA, 20 Browse, 22 Identity Theft.

Down: 1 Wine, 2 Finite, 3 Autocue, 4 SCART, 5 Frugal, 6 Black Box, 11 Gray Code, 13 Cowboys, 15 Eocene, 17 Trophy, 18 Valid, 21 Safe.

DISCLAIMER

The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. Snow, snow, snow. Everywhere we looked this week, we saw tons of the stuff, falling from the heavens like... well, snow. Our first encounter with it down in the south was when we woke to find it already covering every street, rooftop and car in the area. But then it all melted away by the afternoon. A few days later, though, it snowed again, but this time it didn't settle. No, this time,

we just had the joy of trudging through slush and having tiny flecks of the stuff getting in our eyes and making us generally wish we lived somewhere warm. Nevertheless, things could always be worse – a point brought home to us by our game of the week, *Dying Light*, which is set in the middle of a zombie apocalypse. Yes, it might be freezing cold outside and your heating bill might be going through the roof (in spite of how much insulation there is in the loft), but at least no one is trying to eat your face off – although we wouldn't be surprised if the energy companies started trying to, after they've taken your first born child and a couple of your less important internal organs. There's only so much money they can take after all. So there you go. Zombies and snow. You heard it here first.



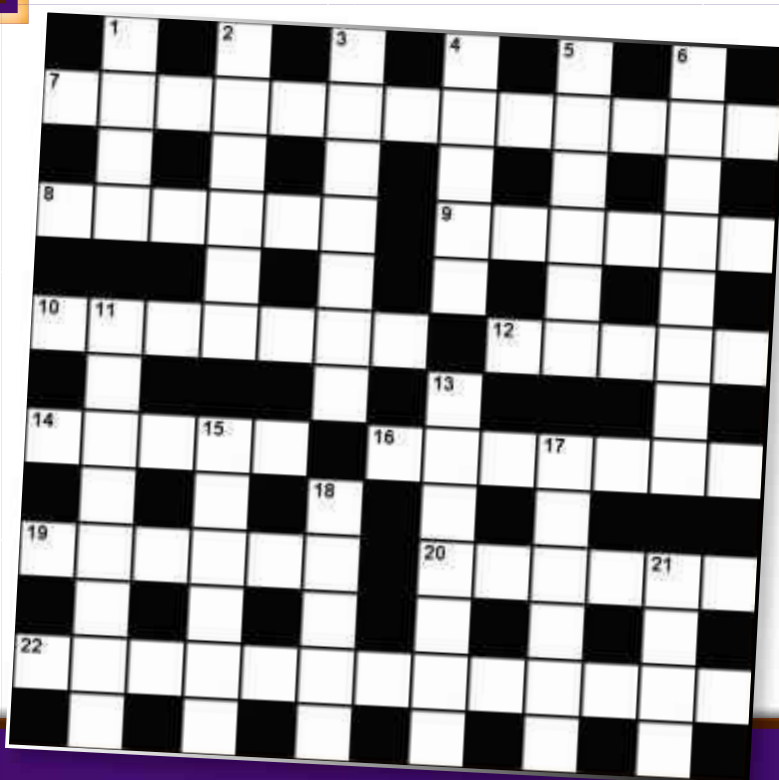
THIS WEEK'S CROSSWORD

Across

- 7 The use of graphical user interface elements to emulate objects in the real world. (13)
 8 A support action of the European Seventh Framework Programme for European academic and industrial groups in superconducting technologies. (1-5)
 9 100,000 dynes. (6)
 10 Separate into parts or portions. (5,2)
 12 The act of undergoing testing. (5)
 14 The vapour into which water is converted when heated. (5)
 16 You either love it or hate it. (7)
 19 German mathematician who realised that the planets go around the sun in elliptical orbits. (6)
 20 A psychometric procedure designed to measure one's ability to comprehend. (2,4)
 22 Russian aeronautical engineer who produced Russia's first jet bomber and jet passenger aircraft. (6,7)

Down

- 1 Move quickly and in an unmethodical way from one point or subject to another. (4)
 2 The positively charged central cores of atoms that contain most of their mass. (6)
 3 Something that makes a process or activity happen or happen more quickly. (7)
 4 Write clearly without joining the letters together. (5)
 5 A brief period of precipitation. (6)
 6 Having the same vowel sound occurring with different consonants in successive words or stressed syllables. (8)
 11 Regular and intelligible forms or sequences discernible in the way in which things happen or are done. (8)
 13 A bulletin board system, originally developed by Scott J Dudley through his company, Lanius Corporation. (7)
 15 The power to entice or attract through personal charm. (6)
 17 The action or process of moving or being moved. (6)
 18 A robot, usually intelligent. (5)
 21 In graphics, to slant a selected item in any direction. (4)



In Next Week's Micro Mart*

- Upgrades special!
- The best budget components
- Choosing the right SSD
- Which processor should you buy next?
- Do you really need DD4 RAM?
- Plus loads more, including the usual mix of news, reviews and advice



* May be subject to change



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